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*Reifenstein, E. C., Jr., in Harrison, T. R.: Principles of Internal Medicine, ed. 2, New York, The Blakiston Company, Inc., 1954, chap. 98, pp. 702, 703.

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Femoral Shortening for Equalization of Leg Length

GEORGE M. HART, M.D.

Minot, North Dakota

EQUALIZATION OF DISCREPANCIES in leg length has long been considered an important problem in orthopedic practice. Compensation for minor differences can readily be made by simply applying a lift to the sole and heel of the shoe on the short side. As the difference in length of the limbs increases, however, the elevated shoe becomes not only more unsightly but more difficult and unwieldy for the patient. It is natural, therefore, that reports of surgical measures to resolve the problem appear early in the literature of orthopedic surgery.

In general, two methods of approach have been considered: (1) shortening of the long leg and (2) lengthening of the short leg. Shortening of the long leg may be accomplished by one of two methods—arrestment of longitudinal growth by cancellation of epiphysial growth, as first advocated by Phemister¹ in 1933, or by actual shortening of one of the bones of the extremity by segmental resection. It is with the latter method that this article is concerned.

Steindler² noted that femoral shortening was first carried out in 1847 by Rizzoli, whose claim of priority has not, however, found much recognition. His method was osteotomy with overriding of the bone fragments. Two other authors

used similar technics, Mayer in 1850 and Sayre in 1863. In 1908, Glaessner³ reported 2 cases and Deutschländer⁴ described fixing the fragments with an aluminum plate and screws. Shands⁵ recorded 3 cases in 1917, using wire sutures for fixation of the bone ends. Fassett⁶ in 1918 described fixation of the fragments with a Lane plate in 3 cases. In another case, he used a tongue and groove osteotomy. Royle,⁷ in 1923, described 5 cases, 4 of which were fixed with intramedullary pegs and 1 with a Lane plate.

In 1935, White⁸ described a method of femoral shortening which has since been widely accepted. He performed a transverse osteotomy of the mid-third of the femur. The bone fragments were allowed to override the correct amount and were fixed by obliquely placed, removable pins. A plaster hip spica cast was applied from the toes to the ribs with the hip slightly flexed and abducted. The knee was similarly flexed, and the pins were incorporated in the cast. Four weeks postoperatively the pins were removed. The cast was maintained for an additional month and then removed if x-ray examination revealed sufficient callus formation.

In 1940, Harmon,⁹ in discussing the surgical treatment of unequal leg length, noted that either the tibia or femur could be shortened as much as 3 in. He felt that femoral shortening was usually more applicable. The site elected for this procedure was at the junction of the middle and lower thirds of the femur. The author

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used a Gigli saw to sever the bone transversely and then removed the desired excess bone with a hand saw. The excised bone was split into several fragments, one of which was constructed to fit snugly as an intramedullary graft. The remaining pieces of bone were placed across the osteotomy site as onlay grafts. Bronze aluminum wire was used in a number of cases to prevent separation of the bone ends. The author concluded that although epiphysial arrest was the most conservative surgical method of equalizing leg length, it was limited to the seventh to twelfth years in girls and the seventh to fifteenth years in boys. He stated that the most exact universally applicable method of equalization of leg length was operative shortening of the sound extremity.

Howorth,¹⁰ in 1942, described his operation for femoral shortening. An osteotomy was carried out in the mid-shaft of the femur by making drill holes to step-cut the bone. Separation was completed with an osteotome. The required amount of bone was removed, and a bone plate was applied to the shaft of the femur securing the fragments. A double hip spica cast was worn three months postoperatively, depending on healing.

Blount,¹¹ in 1943, in discussing the use of his blade-plate for internal fixation of high femoral osteotomies, mentioned use of the plate for internal fixation after femoral shortening. A Blount plate with a single angle was placed in the neck of the femur, and a screw was inserted through the proximal hole of the plate into the subtrochanteric region of the bone. Osteotomy was performed distally to the screw, and the required length of bone was removed from the femoral shaft. The bone ends were approximated and additional screws placed through the plate for fixation.

In 1947, Moore¹² described a method of shortening through the supracondylar region of the femur. He noted that, in published reports, the usual site of election for this procedure was the diaphysis. He felt that the maximum correction advisable was about 3 in. and that shortening in excess of this amount tended to produce permanent quadriceps weakness. Moore used a lateral approach to the distal end of the femur and sectioned the bone with a Gigli saw just above the condyles. The shaft of the femur was displaced outwardly, and a proximal osteotomy with a Gigli saw was carried out, removing the required length of bone. The resected segment was divided longitudinally into several parts with a motor saw, and one fragment was used as an intramedullary graft between the femoral cond-

yles and the shaft. The graft was inserted first into the proximal shaft of the bone and secured with a single transfixion screw passing through both cortices and the graft. The protruding end of the graft was then introduced into the metaphysis and likewise secured with a transfixion screw. The remaining bone segments were used as onlay grafts across the osteotomy site. Postoperative immobilization was maintained in a single hip spica cast. The author noted that the longest period of postoperative immobilization required was sixteen and one-half weeks in his series of 15 cases. The average period of immobilization was ten weeks, and weightbearing with support was begun in the cast six to eight weeks after operation. In all of his patients, quadriceps power returned to normal soon after removal of the cast, and no permanent quadriceps weakness occurred.

Thornton,¹³ in 1949, described a method of subtrochanteric femoral shortening. The upper third of the shaft of the femur and the trochanter were exposed by a lateral incision, and a Smith-Petersen nail was placed in the neck and head of the bone. Osteotomy was performed in the subtrochanteric region. A flange of bone was left extending down along the medial cortex of the proximal fragment. The required length of bone was then removed from the distal fragment, the fragments of bone were brought into apposition, and a plate was attached to the Smith-Petersen nail. This was fastened to the femoral shaft below the osteotomy with screws penetrating both cortices. No external fixation was used postoperatively.

White, in discussing Thornton's procedure, made a plea for shortening the middle third of the femur, noting that in 5 of 6 subtrochanteric shortenings which he had performed, 2 resulted in delayed union and 1 in nonunion. When he performed femoral shortening in the middle third of the bone, no delayed unions or nonunions occurred. J. Albert Key stated, "I have used the subtrochanteric method and I do not like it very well."

In 1951, Eyre-Brook¹⁴ described his operative technic, which was essentially the same as that described by White except that transfixion screws instead of metal pins were placed transversely through the overriding fragments. He noted that in one of his patients, the leg was shortened 4 in. and normal quadriceps power maintained.

In 1954, Thompson and associates¹⁵ compared results and complications of femoral shortening by means of oblique osteotomy with screw fixation and transverse osteotomy with intramedullary nail fixation. The former consisted of placing

a long osteotomy obliquely through the mid-third of the femoral shaft. The line of osteotomy was marked with numerous drill holes, and the operation was completed with an osteotome. The distal and proximal spikes were then overlapped to produce the desired amount of shortening, and the protruding ends were removed. A fracture clamp was used to hold the bone ends in apposition, while 4 transverse screws were placed in staggered relationship to each other for fixation. Postoperatively, a single hip spica cast was applied or the extremity was suspended in a Thomas splint.

In shortening the femur by transverse osteotomy, Thompson removed the required segment of bone by making 2 transverse cuts through the mid-shaft. A Kuntscher nail was then placed intramedullary to secure the fragments. A staple was driven across the osteotomy site in several cases to prevent distraction of the fragments. The fragment of bone removed during the osteotomy was cut into longitudinal segments and placed across the osteotomy site as a bone graft. Thompson concluded from a study of his 2 series of cases that secure internal fixation was not provided by intramedullary Kuntscher nail fixation alone. He suggested the use of staples across the bone ends to prevent distraction of the fragments. He felt that transverse osteotomy of the femur with intramedullary fixation was not a simple procedure and one often attended by serious complications. As oblique osteotomy with screw fixation was uniformly successful in his hands, he preferred this method.

In 1955, Jones¹⁶ described a method of femoral shortening by "oblique-step" osteotomy and intramedullary fixation. With this operation, the author attempted to avoid one of the complications noted by Thompson—distraction of the fragments after osteotomy and intramedullary nailing. He shaped an oblique-step osteotomy so that the distal end of the proximal fragment and the proximal end of the distal fragment were wider than the radius of the shaft of the femur. The plane of each step then inclined away from the midline proximally on the proximal fragment and distally on the distal fragment to become slightly less in width than the radius of the shaft. The two projecting segments locked with each other when placed together and were held by an intramedullary femoral nail. No screws were used, and distraction was prevented by the interlocking of the oblique-step projections.

INDICATIONS FOR FEMORAL SHORTENING

Surgical shortening of an extremity is not considered unless the discrepancy in length is great-

er than 1 in. By tilting the pelvis, a person of average stature can compensate for shortening of $\frac{1}{2}$ or $\frac{3}{4}$ of an inch. Inequalities of 1 or $1\frac{1}{4}$ in. can readily be corrected by lifting the heel of one shoe and dropping the opposite heel. Minor shoe corrections such as these are not readily noticeable either to the patient or to others. When the discrepancy in length approaches $1\frac{1}{2}$ in., however, the patient frequently prefers surgical shortening to a shoe with a built-up sole and heel of an inch or more.

There are many causes of unequal leg lengths. Fractures occasionally heal with overriding of the fragments, producing shortening, or the epiphyseal line may be involved, creating an arrest of growth. Bone infections, including pyogenic osteomyelitis, tuberculosis, variola, or syphilis may produce either relative lengthening of the involved bone or shortening of the extremity. Bone tumors may be responsible for differentials in extremity growth. Neurofibromatosis is frequently attended by enlargement in breadth and increase in length of an extremity. Congenital abnormalities, including arteriovenous aneurysms and congenital absence or malformations of bone, contribute to variations in leg length. Residuals of poliomyelitis frequently produce a differential in the rate of growth of the lower extremities. Prolonged cast immobilization in growing children may contribute to a slowing of the growth of the immobilized extremity.

An inequality of 2 in. or more prevents the patient from standing with the legs together unless the hip and knee are flexed on the long side and interferes considerably with normal activities, such as walking, running, sports, and dancing. Howorth noted that his patients desired leg shortening because of limp, the necessity of wearing a raised shoe and the associated asymmetric and undesirable appearance of the foot and leg. Pain was an unimportant factor. Partial disability in walking, running, working and playing was present in most of his patients. He noted that the long leg was usually completely sound except for occasional minor involvement in patients whose opposite leg was short as a result of poliomyelitis.

OPERATIVE LENGTHENING VERSUS SHORTENING

When studying the problem of equalization of leg length, the first inclination is to correct the deformity by lengthening the short extremity. By doing so, the involved rather than the normal extremity is operated upon, and the patient retains his height. However, because of numerous complications following leg lengthening procedures, the trend at present is to approach the

problem by the less dramatic but safer procedure of femoral shortening. As noted by White, in patients with lower extremities differing enough in length to necessitate an operative procedure, the short limb is almost invariably sufficiently involved with atrophic muscles so that further stretching by a lengthening procedure would result in inadequate function. Complications of lengthening include nonunion, postoperative infection, and traction damage to nerves, vessels, and muscles which frequently result in postoperative deformities of the extremity.

Abbott and Saunders,¹⁷ who worked extensively with the problem of bone lengthening, wrote in 1939: "We emphasize that the procedure of bone lengthening is, and in all probability always will be, a major operation with the possibility of serious complications."

A well-founded criticism of femoral shortening is the fact that the well leg is jeopardized. Beside the aesthetic reaction against reducing height, the possibility of surgical sepsis exists. However, if this fear on the part of the surgeon is great, as pointed out by White, shortening of the long leg should not be attempted.

COMPLICATIONS

Thompson has discussed in detail the complications following operative shortening of the femur with intramedullary nail fixation. In his series of 11 patients, 5 operative complications occurred. In 3 of the patients, the nail was too tight, while in 2, it was too loose. Fragmentation of the osteotomy site occurred in 1 patient. This was regarded as unfortunate because of the possibility of shortening the leg more than anticipated. In 2 patients, difficulty was experienced in placing the intramedullary nail. In 1 instance, the nail became wedged in the distal fragment of the femur leaving an excessively long portion of nail protruding above the greater trochanter. In another instance, the nail impacted and broke above the greater trochanter when continued attempts were made to drive it against resistance.

In 2 patients, the Kuntscher nail fit too loosely in the medullary canal. Staples were used to bridge the osteotomy site in 1 of them, and union occurred without complication. However, in the other, distraction of the femur occurred, requiring a secondary stapling operation three weeks later.

Fourteen postoperative complications occurred in the 11 femoral shortenings performed by Thompson. These included painful irritation produced by the proximal tip of the nail at the greater trochanter; severe and disabling gluteal pain with sciatica, which was relieved by removal

of the Kuntscher nail; angular deformity caused by bending of the nail one month postoperatively; and fracture of the nail.

Genu recurvatum occurred in 4 of Thompson's patients after Kuntscher nail fixation. In 3 of these patients, the femur had been shortened 5 cm. or more. The genu recurvatum persisted in 3 patients from one to five months and in the fourth for two years. Thompson noted that this complication had not occurred in patients in whom femoral shortening had been carried out by oblique osteotomy and felt that the deformity was produced by temporary partial loss of muscle tone in the thigh.

Thompson also noted that secure healing as demonstrated by x-ray examination seemed to be obtained more rapidly in patients treated by oblique osteotomy than in those in whom fixation was accomplished by means of an intramedullary nail. Although abundant peripheral callus appeared early in patients treated by transverse osteotomy and Kuntscher nailing, obliteration of the osteotomy site did not occur until eight to ten months postoperatively. In patients in whom oblique osteotomy was performed, union usually was complete by the end of the fourth month.

TECHNIC

The desired length of bone to be removed is determined by clinical measurement of the lower extremities between the anterior superior iliac spines and the medial malleoli. The patient is placed upon the operating table in the supine position, and the limb is draped to expose the thigh and the region of the greater trochanter. Using Henry's¹⁸ technic, an anterolateral incision is made. The rectus femoris muscle is retracted medially and the vastus lateralis laterally to expose the vastus intermedius, which is split longitudinally and reflected subperiosteally from the femoral shaft. A series of longitudinal drill holes are made through the mid-shaft of the femur, passing in an anteroposterior direction through the anterior and posterior cortices of the bone. These holes are placed in a Z-shaped configuration to outline a step-cut osteotomy. The longitudinal length of the osteotomy is twice the length of the desired amount of bone to be removed. The drill holes are then connected by means of a sharp osteotome, using care to avoid splintering or splitting the femoral shaft. The desired length of bone is then removed from each of the proximal and distal fragments with a motor saw.

A Kuntscher cloverleaf nail is used for intramedullary fixation of the bone. A guide pin is first introduced into the medullary canal of the

proximal fragment and directed proximad to emerge above the greater trochanter through the skin of the buttock. The thigh is adducted and flexed at the hip during introduction of the guide pin in order to place the point of emergence on the buttock as close to the greater trochanter laterally as possible. The proper length of nail is determined preoperatively by clinical measurement of the extremity, and the diameter of the pin is determined during the operative procedure by introducing nails of various sizes into the medullary canal of the femur. The nail should fit snugly within the medullary canal but should not be so great in diameter that the femoral shaft is split during its insertion. The proper diameter can be judged by striking the nail with a mallet and noting its progress into the bone. A nail of proper diameter will advance 3 to 4 mm. with each mallet stroke. After the proper sized nail has been chosen, it is introduced along the guide pin into the proximal fragment of the femur so that it is just visible at the osteotomy site. The femur fragments are then reduced and held with a bone clamp while the nail is driven into the distal fragment. X-rays are made on the operating table in both the anteroposterior and lateral planes. Films of sufficient size are used so that the knee joint is visualized to determine the position of the distal end of the intramedullary nail. Two metal screws are then placed transversely across the step-cut osteotomy to prevent distraction of the bone fragments. In preparing the drill holes for the screws, the intramedullary nail must be missed with the drill point. Sufficient cortex is present, however, to provide secure fixation of the fragments with the screws.

Postoperatively, the patient is kept at bed rest until quadriceps strength is sufficient for active straight leg raising. He is then allowed to become ambulatory on crutches and instructed to walk in normal fashion, placing approximately the weight of the shortened extremity on the floor. Two to three months postoperatively, if x-ray examination reveals sufficient callus formation, the crutch on the operated side is discarded. The intramedullary nail is removed in one and one-half to two years, when the osteotomy site is shown to be completely crossed by normal bone trabeculae on x-ray examination.

CASE REPORT

J.L.R., age 6, was examined at a crippled children's clinic May 8, 1948, by another orthopedist. Examination revealed a waddling gait, a bilateral positive Trendelenburg test, and limited abduction of both hips. A roentgenogram of the pelvis disclosed bilateral congenital dislocation of the hips.

She was admitted to Trinity Hospital June 28, 1948,

where Kirschner wires were placed through the supracondylar regions of both femurs, and skeletal traction was applied until August 10, 1948, when the right hip was exposed through a Smith-Petersen incision. The capsule of the joint was found to be markedly thickened and the neck of the femur shortened and anteverted. The head of the bone was somewhat flattened and the acetabulum was shallow and filled with fibrous tissue which was excised. The ligamentum teres appeared rudimentary. The head of the femur was reduced into the acetabulum and a rim of bone turned down with a curved chisel from the ilium, including the upper acetabular rim. Bone was removed from the wing of the ilium and placed as a wedge above the shelf. A hip spica cast was applied postoperatively. Skeletal traction was continued on the left lower extremity until September 30, 1948, when the left hip was operated upon. The head of the femur was found to lie above the acetabulum, which was also filled with fibrous and fatty tissue and excised. The hip was then easily reduced and was moderately stable. A shelf was turned down from above the acetabulum, including the acetabular rim, and bone was taken from the ilium above to form a wedge above the shelf. A bilateral subcutaneous adductor tenotomy was also done. A single hip spica cast was applied postoperatively. The patient was discharged from the hospital December 21, 1948, on crutches.

On February 25, 1949, she was readmitted to the hospital for physiotherapy and instruction in gait. She was able to walk fairly well when discharged April 18, 1949. She had a negative Trendelenburg test bilaterally, but some internal rotation of both lower extremities and adduction of the right thigh were present. She returned to the hospital July 15, 1949, for a supracondylar rotation osteotomy of the left femur.

Examination November 1, 1949, demonstrated that she walked with both feet pointing forward, had negative Trendelenburg tests bilaterally, and the hips felt stable.

The patient was seen about once yearly by various



Fig. 1. Roentgenogram of pelvis June 19, 1956, eight years after bilateral open reduction and shelf operations for congenital dislocated hips. Shelf on the left has absorbed, but both hips remain in acetabula and range of motion is excellent.

Fig. 2. Roentgenogram of left femur August 5, 1957, seven weeks after shortening and fixation with intramedullary nail. Transverse screws prevent distraction.



orthopedists at crippled children's clinics from 1949 to 1957. During this time, a gradual relative discrepancy between the length of the lower extremities was noted. When examined June 19, 1956, leg length was found to be 31½ in. on the right and 33¼ in. on the left. It was further noted that she walked with a slight right hip limp and that the Trendelenburg test was negative on the left but slightly positive on the right. Motion in both hips was excellent. An x-ray of the pelvis (figure 1) revealed that the hips were seated within the acetabula. A good shelf was present on the right. The head of the right femur was somewhat flattened, and the neck was somewhat shortened. The shelf on the left had absorbed. She was advised to wear a 1-in. lift on her right sole and heel, and the possibility of shortening the left femur was discussed.

She was next seen May 1, 1957, at a crippled children's clinic by another orthopedist. He noted that the right lower extremity remained 2 in. short and discussed femoral shortening with the family as the patient was not wearing a shoe lift for "social reasons."

The girl returned to the Northwest Clinic, June 17, 1957, at the age of 15 years. Leg length now was 31¼

in. on the right and 33¼ in. on the left. On June 18, 1957, she was admitted to the hospital for shortening of the left femur. A step-cut osteotomy was made in the mid-shaft of the femur using a motor drill and an osteotome. The length of the longitudinal limb of the osteotomy was 3 in. to produce 1½ in. of shortening. One and one-half inches were removed from both the proximal and distal fragments of the femur, and the bone fragments were reduced and held with a bone clamp while a Kuntseher cloverleaf intramedullary nail was inserted. Two metal screws were placed transversely across the tongues of the osteotomy. Postoperative recovery was uneventful. Physiotherapy was started postoperatively and by July 10 she was able to actively lift her left leg when lying in the supine position, and ambulation on crutches was begun. She was discharged from the hospital July 14.

She was last seen in the office August 5, 1957, walking well with two crutches. Leg length measured from the anterosuperior spine to the medial malleolus was 31 in. on the right and 31½ in. on the left. Measurements from the anterior spine to the upper pole of the patella were 15 in. on the right and 15½ in. on the left. A roentgenogram of the left femur (figure 2) revealed that the fracture fragments and the metal fixation had remained in satisfactory position and alignment with good callus formation. She was advised to place about 25 per cent of her weight on her left leg and to discontinue the left crutch in about six weeks.

SUMMARY

Femoral shortening is an accepted method of equalization of leg length after the individual is past the age when epiphyseal arrest is effective. The advantages of intramedullary fixation can be utilized if proper selection of nail size is made and distraction is prevented by internal fixation.

A case report is presented in which step-cut osteotomy and intramedullary nailing are combined with simple screw transfixion for fixation and prevention of distraction. The literature of femoral shortening is reviewed.

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Angina Pectoris Treated by Relaxation and Automatic Attentive Respiration

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TWENTY-ONE PATIENTS in whom angina pectoris developed after severe coronary disease and/or coronary thrombosis were followed carefully between the years 1925 and 1955. Satisfactory results were obtained by teaching them simple methods of relaxation, mild light physical exercises, and, most important, automatic attentive diaphragmatic breathing at stated rest periods three to four times daily with a natural pause between the respiratory functions.

Of these 21 patients, 12 are living and are comfortably well. Two died from coronary thrombosis, and 7 died from other than cardiac causes. But, all of them were free from pain at least for more than two years after they learned the technic of automatic relaxed diaphragmatic breathing. One was under care for over thirty years, and he was presented before several medical groups to demonstrate the method and rationale of breathing. His death was caused by an accident after the Christmas holidays in 1955.

This case of H. R. was reported before in 1948.¹ To briefly summarize it, this patient had an acute myocardial infarction in 1924. He came under medical care one year later in September of 1925 with symptoms of angina pectoris, from which he had obtained relief by taking nitroglycerin sublingually.

He was taught the method of relaxation and automatic attentive breathing. He gradually showed improvement and was symptom-free and normally active until the day of his sudden death. He had not needed nitroglycerin nor had he been confined with any major ailment for twenty-eight years. His electrocardiograms were always abnormal (figure 1).

The pathologist, Dr. S. T. Nerenberg, stated in H.R.'s autopsy report: "The main left coronary artery and descending branch show severe intimal arteriosclerosis. The circumflex branch and right coronary vessels show only mild to moderate intimal arteriosclerosis. On opening into the cardiac chambers, the left side of the heart is

seen to be moderately dilated. The left ventricular wall is hypertrophied. The heart weighs 500 gm. The valves are all grossly normal in appearance. The right side is not remarkable."

During the last thirty years of his life, this patient had spent ten minutes or more two to three times a day performing this relaxation and breathing exercise, apparently with good results.

This presentation will not analyze the age and sex of the 21 patients nor will etiology be discussed. Two subjects will be presented: (1) the technic that was used and (2) the rationale most likely to produce satisfactory results.

TECHNIC

If an angina pectoris patient was on any medication when we started our training, he was advised to continue temporarily. However, the chief aim has been to reduce the physical and mental tension and effort. The patient was told to: "Put yourself at ease at the first appearance of pain. Bring to mind some pleasant thought and then relax your entire body. Keep the lips closed but teeth slightly apart, and, if necessary, put the tongue somewhat between the teeth so as to keep them apart, which helps to keep the jaw and facial muscles relaxed. Then, with the rest of the body in a state of relaxation, turn the attention to slow diaphragmatic breathing. Slow down the breathing without effort, make breathing effortless. Bring the breathing rate down to 6 per minute or less and at ease."

Some of these patients could breathe at a rate of only 2 per minute (figure 2) for ten to fifteen minutes or longer and then feel completely relaxed.

Patients were instructed to cultivate effortless breathing with a pause after inhalation and after exhalation. The pauses between respirations were extremely important to our observations, and that phase will be discussed later.

RATIONALE FOR TREATMENT

1. When the body musculature is at ease, the oxygen demand is greatly reduced.

Krogh² called attention in his book, *Anatomy*

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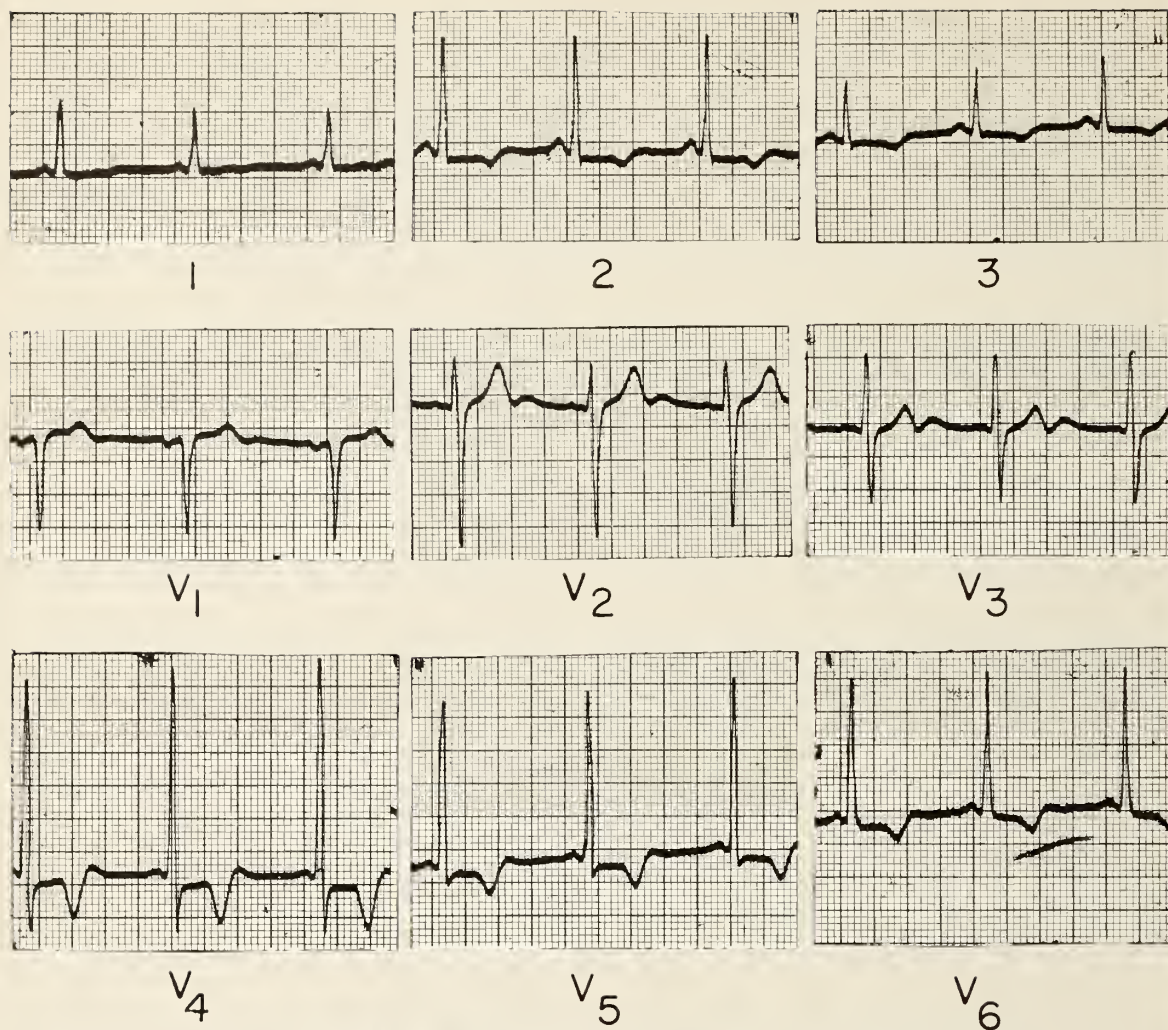


Fig. 1. Abnormal electrocardiogram and yet patient fully active and comfortable.

and *Physiology of Capillaries*, that at rest the body musculature needs only 1/15, and could be as low as 1/30, of the oxygen that is required during marked activity.

Best and Taylor³ showed that slow deep breathing affords a better oxygen supply than fast shallow breathing. Thus relaxation and automatic attentive breathing afford a reduced demand and increased supply of oxygen.

2. Slow diaphragmatic breathing reduces cardiac effort. During inhalation, the lungs widen and lengthen. According to Macklin,⁴ the pulmonary vasculature both lengthens and widens. So, while blood accumulates in the pulmonary vessels during inhalation, less blood is returned to the left side of the heart. Then, too, during a deep inhalation as the lungs are distended, the superior vena cava and the subclavian veins are compressed between the distended upper lobes of the lungs and the first ribs.⁵ These vessels are

compressed, and blood is not returned to the right heart during the latter half of a deep inhalation. Similarly, the inferior vena cava is very easily compressed between the diaphragm and the posterior edge of the liver.⁶ After all, the pressure in the veins, both superior and inferior vena cava, is very low—only about 8 to 15 mm. of Hg. The veins are soft as compared to the arteries, and not much pressure is required to shut off the return of blood to the right heart. Thus, during deep inhalation, less blood is returned both to the left heart and to the right heart. And, the heart gets a reduced work load after about the third pulse beat.⁶

Bearing in mind that the pulsations during the time of deep inspiration mean less work for the left heart, we can simplify the explanation for the benefits derived by taking for an example person A with a pulse rate of 80 per minute and a respiratory rate of 20 and compare him with person

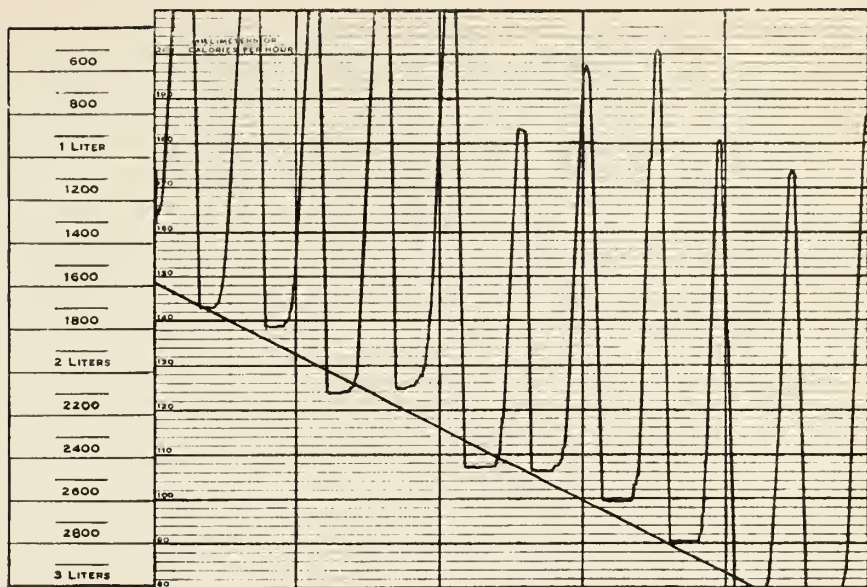


Fig. 2. Respiration chart illustrating an automatic respiratory rate of less than 3 per minute.

B, whose pulse rate is 80 but whose respiratory rate is only 4. Then, of course, person A would have 20 inspirations and 20 expirations which means 40 actions during that minute of 80 pulse beats. Dividing 80 by 40 gives us 2 pulse beats during an inspiration. However, if person B breathes only 4 times per minute, that means he has 8 actions—4 inspirations and 4 expirations—and dividing 80 by 8 gives us 10 pulse beats per minute or 7 pulsations for reduced left heart effort. That could mean a reduced oxygen demand for the cardiac musculature.

$$A. \frac{80}{40} = 2 \quad B. \frac{80}{8} = 10$$

3. Breathing affects the acid-alkaline relationship in the blood and in the other body fluids and tissues as well.⁷ Normally, the pH of the blood is about 7.4 but it shifts with respiration, 7.35 on inhalation and 7.45 on exhalation. That shift takes place at the usual respiratory rate of 16 to 20 per minute. However, if the respiratory rate is markedly slowed up, the pH shift will be greater, since, during inspiration, CO₂ is retained and increases the hydrogen ion concentration in the blood.⁷ And, since the hydrogen ion has a very rapid diffusion rate, it affects all other tissues as well.³ So, a definitely slowed-up respiratory rate may well affect the body, possibly through the Krebs cycle,⁸ wherever it functions in the body tissues.

4. I would also like to call attention to the action of the hemoglobin-oxygen pump.⁹ For, as the blood flows through the capillaries in the alveoli of the lungs, the carbon dioxide is delivered and flows into the alveolus. On the other hand, the oxygen that is present in the alveolus is

absorbed by the hemoglobin and is carried into the circulations. The carbon dioxide comes into the alveolus where, if the alveolus is contracting and ventilating, it is only pushed upward. Otherwise, since the CO₂ molecule is heavier than the O₂ molecule, it remains and is accumulated in the alveolus and also in the terminal bronchus,¹⁰ and its concentration *increases with the increasing pause* following an inhalation and exhalation. While the carbon dioxide content in the air is only .04 per cent, in the alveoli, it is a little better than 4 per cent, depending upon the rate of respiration. If respiration is slow with a lengthened pause, then the concentration of CO₂ in the alveoli and terminal bronchi is much greater. If respiration is very slow, the concentration of CO₂ may be better than 8 per cent.¹⁰ A concentration of CO₂ of 8 per cent or more has anesthetic qualities and contributes valuably to the acetylcholine cycle.¹¹

Gesell and associates¹¹ have shown that the acetylcholine production in the lungs can be increased fivefold or more with an increase of CO₂, since CO₂ checks the action of cholinesterase which destroys acetylcholine. So, if respiration is slowed up to 6 per minute or less, the amount of CO₂ in the alveoli and terminal bronchi is increased and the acetylcholine function is improved. Acetylcholine also has a very marked permeability rate and even though it is short lived due to the ubiquitous cholinesterase of the tissue, in the presence of an increased CO₂ concentration, its life cycle is longer.¹ That, too, very likely improves the function of the coronary blood flow by its vasodilator action. Therefore, slow, automatic, deep diaphragmatic breathing

at a rate of 6 per minute or less with a pause between both inhalation and exhalation can be a valuable adjunct in the treatment of angina pectoris.

5. One may speculate also that with a breathing rate reduced to 6 or less per minute and with a lengthened and more effective inhalation period, the diastoles, which take place during such inhalations, afford a greater gradient of systemic pressure¹²⁻¹⁵ in the right auricle than in the left

ventricle. Since during diastole, the pressure in the left ventricle is supposed to be zero, diastole at a very slow breathing rate may well provide an opportunity to call the thebesian and luminal vasculature into play and, perhaps, improve the collateral coronary circulation.^{13,16}

In summary, an additional report is made on automatic attentive breathing and relaxation as a valuable adjunct in the treatment of angina pectoris.

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HEMATEMESIS, melena, or shock is often the first manifestation of acute ulceration of the gastrointestinal tract which may occur as a result of stress after cardiac surgery. These lesions often arise without previous ulceration and without premonitory symptoms; hemorrhage, perforation, and death may ensue. Patients who have responded abnormally to stress in the past appear prone to stress ulcers. However, this complication cannot be predicted with accuracy.

The abdomen, as well as the heart and lungs, should be examined frequently after cardiac operations. Sometimes, rectal examination may be advisable to detect melena. The physician should be alert to the possibility of acute ulceration in any patient whose progress is not normal after an operation on the heart.

Immediate transfusion and early surgery may be lifesaving. Abdominal exploration should not be deferred simply because the patient has recently had a cardiac operation.

Of 7 patients with acute peptic ulceration after cardiac surgery, 4 died and 1 had emergency gastric resection.

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The Diagnostic Value of Various Ocular Symptoms

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MANY OCULAR SYMPTOMS are so characteristic that diagnosis may be made solely from the history. Others are sufficiently suggestive to permit a minimum of delay in proving the diagnosis. Still other symptoms of organic ocular disease enable the alert physician to make the correct diagnosis even though the eyes may be normal at the time of examination. The discussion that follows concerns, for the most part, such characteristic complaints and omits those of lesser diagnostic value.

As the eye is primarily an organ of sight, it is plain that the major, most frequent, and most varied complaints are those pertaining to disturbances of vision which may occur in one or both eyes. This paper will center chiefly around various disturbances of sight and pain, as nearly all other ocular symptoms are accompanied by rather obvious signs.

DISTURBANCES OF VISION

Complaints due to *errors of refraction* include the following.

1. *Blurring of distant vision only* is usually due to *myopia*. It is common among children, although they are almost never aware of this visual defect unless the school nurse or teacher discovers it. Such children often unconsciously but efficaciously better their vision by narrowing the palpebral fissures. In so doing, they wrinkle up their noses and their eyelids, a characteristic gesture. Early nuclear cataracts and uncontrolled diabetes often cause progressive myopia, and, thus, they produce blurred distant vision without notable decrease of near vision.

2. *Blurring of near vision only* is due to just one thing—inadequate accommodation. It is found: (a) among hyperopes whose far-sightedness is either undercorrected or inadequately corrected; (b) among patients of the third and

fourth decades of life who have subnormal accommodative power or premature presbyopia; (c) among patients in the fifth or older decades whose presbyopia has become manifest; (d) among patients who have developed a temporary subnormal accommodation while under treatment for hypertension with the ganglion-blocking agents; and (e) among patients who have had atropine, homatropine, cyclopentolate (Cyclogyl), or other cycloplegics instilled into their eyes or who may be using systemically excessive amounts of atropine, belladonna, trihexyphenidyl (Artane), or other antispasmodic agents. Patients who have internal ophthalmoplegia as a result of palsy of the third cranial nerve are usually so disturbed by the resultant diplopia that they do not complain of being unable to read with the affected eye.

3. *Blurring of both distant and near vision* requires complete ophthalmologic examination, as it may be due to a variety of causes, such as uncorrected refractive errors, cataract, glaucoma, or disease of the cornea, vitreous, retina, optic nerves, or the higher visual pathways.

Intermittent blurring of vision of both eyes lasting several hours to a day or more may be caused by diabetes, for fluctuations in the blood-sugar level cause changes in the density of the lens and, therefore, produce variations in the refractive power of the eyes. Sometimes there may be a difference of as much as 2 or 3 diopters on successive days. Intermittent loss of vision of one or both eyes is a very common symptom of insufficiency of the basilar or carotid artery and is usually of four or five minutes' duration. This symptom also accompanies the choked disks of increased intracranial pressure.

An instantaneous loss of vision in one eye unaccompanied by pain or other symptoms is probably due to occlusion of the central artery of the retina. This is especially true if the patient awakens in the morning with a sightless eye. If the individual is more than 60 years old, *temporal arteritis* should be considered and ruled out as soon as possible. Half of such patients go blind in the remaining eye during the next few

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hours or days. Patients with temporal arteritis often complain of transient diplopia or amaurosis fugax several hours prior to the actual permanent visual loss. The ophthalmoscope may show a swollen, hazily seen optic disk and, perhaps, several cotton wool patches in the retina. The patient may have had tender scalp arteries, an influenza-like syndrome, and temporal headaches for the previous several weeks. He frequently has an erythrocyte sedimentation rate of more than 100 mm. in one hour (Westergren method). Biopsy of the temporal artery usually corroborates the diagnosis. Very high doses of cortisone are a specific treatment for temporal arteritis and prevent further loss of vision. There is no good treatment for occlusion of the central artery, although oxygen and anticoagulant therapy should be started if the patient is seen during the first twelve hours.

A moderately rapid loss of vision in one eye occurring over a few hours to a day is usually due to one of the following: (1) occlusion of the central vein, which causes red vision if the hemorrhage extends anterior to the retina into the vitreous; (2) acute glaucoma when the visual loss is accompanied by seeing rainbows around lights, severe pain, cloudiness of the cornea, dilatation of the pupil, and redness and hardness of the eye; (3) acute iritis, with moderate pain, miosis, cloudiness of the aqueous and redness of the eye; and (4) optic neuritis, which causes pain on moving the eye, more rapid loss of vision, diminished pupillary reflex, and papilledema. The same symptoms occur with retrobulbar neuritis, but the disk then looks normal at first.

Loss of vision in both eyes, whether rapid or slow, is caused by bilateral intraocular disease, lesions of both optic nerves, a lesion of the optic chiasm, or a lesion of the higher visual pathways in the cerebrum. Immediate further ophthalmologic and neurologic investigation is indicated.

In addition to losses of vision, such as those previously described, a host of interesting *entoptic visual disturbances* may bring the patient to the physician for examination. The patient's description of most of these disturbances is sufficient for making the diagnosis on the basis of the history alone.

The most common disturbances, of course, are represented by the so-called floaters, spots, or muscae volitantes. Almost everyone can see against the background of blue skies, snow, and bright ceilings the small cobwebby or stringy threads which always float away when one tries to look directly at them. These are small remnants of the fetal vascular system or condensa-

tions of the vitreous and have no pathologic significance. Often, a patient who complains of these disturbances and comes for advice is in an anxiety state or has another, more severe psychiatric problem. Such patients frequently complain also of other entoptic phenomena. They may be alarmed by the dancing lights that are seen when the lids are closed over the eyes. They fearfully observe the after-images that are always present after gazing at bright objects. They often have learned to prolong the duration of these images by blinking their eyes slightly from time to time. Thus, instead of disappearing in a few seconds, these after-images may persist five minutes and longer. Some patients observe the very interesting entoptic phenomenon in which if a bright surface, such as the sky, is observed, they may see a great number of small dancing spots like electric sparks which shoot up suddenly along a curved short path and then disappear as abruptly as they appeared. These are probably red blood cells going through tiny capillaries in the macular portion of the retina.

Another interesting but pathologic visual phenomenon is called "*Moore's lightning streaks*." These are seen more frequently by persons in their fifties, sixties, and seventies but may appear at any age. They come as sudden, bright, lightning flashes in one eye, almost invariably in the far temporal field. Turning the eyes rapidly, shaking the head, or, often, merely walking down a stairway will produce the phenomenon. The cause is a degenerative shrinkage of the vitreous of the eye. In attempting to separate from the contiguous retina, a strand of vitreous tugs and pulls on the retina and causes the lightning streaks. The vitreous continues to shrink and eventually separates completely from the internal limiting membrane of the retina. When this occurs, the patient notes the advent of several large floaters in his field of vision, but the lightning streaks will have gone and will not return. During the period in which the lightning streaks are seen, there is danger the retina may be pulled off, especially if a strand of the vitreous tugs on a cystic space in the retina. Therefore, such patients should have a thorough ophthalmoscopic examination through a widely dilated pupil, using 2 per cent solution of homatropine hydrobromide and 10 per cent solution of phenylephrine (Neo-Synephrine) hydrochloride, to rule out incipient retinal detachment. Sometimes, a small hole is found without detachment of the retina. This is, of course, the ideal time to surgically close such a hole. After the streaks are gone and the floaters appear, the danger of retinal detachment is probably over.

A similar but quite different visual phenomenon is sometimes described as a "lightning streak." This is the peculiar and characteristic *scintillating scotoma of migraine* which takes many forms. However, careful questioning ordinarily leaves no doubt as to the diagnosis. The visual symptoms appear during the aura, supposedly during the period of vasoconstriction of the cerebral vessels. The patient may suddenly see a bright spot of light a little to one side of the axis of his vision. The spot begins to expand and then he notes a loss of part of the letters of words he tries to read, or he may see only the right half or the left half of objects he regards with either eye or with both eyes. The bright area begins to expand further, and it pulsates at a rapid rate (computed to be about 10 beats per second, comparable to the rate of the alpha rhythm in the electroencephalogram). It may expand to fill either the same quadrant in each eye or a whole homonymous half-field, and it may be brightly colored. At its maximum, the whole phenomenon suddenly disappears in a maelstrom of light. The episode usually lasts at least ten minutes and sometimes as long as thirty minutes. Shortly after the aura is over, the headache develops. It usually affects the side of the head opposite to the visual aura and, therefore, corresponds to the part of the brain from which the aura emanated. Sometimes, the visual phenomena may be so-called "fortifications." These are figures which look like the top of an ancient battlement. Other patients may merely see snowflakes or dancing twinkling lights or experience a sensation as of heat waves. Some patients have a homonymous hemianopsia without scintillating lights, which may last ten to thirty minutes. Those who have this phenomenon must be evaluated carefully to be sure an intracranial lesion is not overlooked. Intermittent insufficiency of an internal carotid artery or of the vertebral or basilar arteries may produce a transient homonymous hemianopsia, but never, or almost never, such scintillating scotomas. Many patients who have the typical visual aura of migraine are spared the headaches and suffer only the terrifying visual symptoms.

Patients with tumors of the temporal or occipital lobe sometimes see images or scenes of various types. These are quite different from the phenomena that are described by patients who have ocular migraine, although these phenomena too may appear for short periods. They may occur with increasing frequency several times a week or even daily, in contrast to migraine equivalents which usually have occurred for years and, ordinarily, only once or twice a month.

Patients who have tumors in the parietal lobes are sometimes bothered by peculiar visual disturbances which come periodically. These rare phenomena consist of a confusion of right and left and, sometimes, of an inversion of the environment. Such patients may note that people seem to be walking on the walls of the room in a horizontal position rather than on the floor.

Micropsia is the term applied to the visual phenomenon in which objects appear smaller than they really are. This is commonly due to spasm of the accommodation and is observed among patients whose accommodation is partially paralyzed as in early presbyopia. Voluntary convergence and concomitant accommodation produce micropsia. It is sometimes the presenting complaint in psychiatric patients. Patients who have edema of the macula may have this symptom, although more often they have metamorphopsia.

Macropsia, in which images seem larger than normal, occurs when there are scars in the retina and is rarely observed.

Metamorphopsia, the condition in which the shape of objects is distorted so that a square looks asymmetric or a circle looks oval or a straight line appears bent, usually results from a disturbance of the macula by edema, hemorrhage, choroiditis, detachment of the retina, or other lesions. A hole in the fovea may cause a straight line to be seen as a bisected or bent line. Improperly corrected astigmatism may distort the entire environment so that objects appear twisted or closer or farther away than they really are.

Colored vision, so-called *chromatopsia*, is always indicative of some type of pathological process. Rainbows seen around artificial lights are caused by edema of the cornea, as in acute congestive glaucoma, and sometimes by nuclear cataracts. Rainbows caused by cataracts are constant, while those due to glaucoma appear with a rise of intraocular pressure and disappear when the pressure becomes normal. Red vision occurs among patients who have preretinal hemorrhages or hemorrhage into the vitreous. Exposure to snow or bright lights, aphakia, iridectomy, or prolonged dilatation of the pupil may also lead to red vision. Yellow vision may be associated with jaundice, salicylate poisoning, or carbon monoxide poisoning. White or blue vision may be caused by digitalis intoxication; sometimes objects may appear to be covered by snow.

Photophobia is a common complaint. Organic lesions of the eyes cause severe photophobia. These lesions are always easily discovered by

examination and consist of albinism, lesions of the cornea, and inflammatory involvement of the internal eye. Most people are more comfortable in bright light if they wear colored glasses. However, photophobia is often a symptom of severe psychoneurosis; such individuals seem to find security behind dark glasses and wear them even indoors, a form of purdah.

Oscillopsia is an interesting manifestation of cerebellar or pontine dysfunction. There may be no visible disturbance of eye movements, although sometimes there is nystagmus. The patient complains of inability to recognize people unless he and the person he is attempting to recognize are stationary. One woman complained that whenever she walked into a room, she could not identify any of her friends sitting or standing until she herself had come to a standstill. This phenomenon is usually due to multiple sclerosis but sometimes to other lesions of the pons. It has been observed as a toxic effect of streptomycin on the vestibular nerves. The symptoms result from ataxia of the ocular movements so that the eyes cannot move smoothly from one point of fixation to another.

Double vision requires complete ophthalmologic and neurologic examination. It indicates serious intracranial disease as a rule, since it is due to paresis of one of the extraocular muscles.

Triple or quadruple vision is caused by abnormalities in the cornea, lens, or vitreous of one or both eyes. Diplopia in one eye may have the same etiologic basis.

Night blindness, in which the individual has trouble seeing in dim light, is the result of loss of function of the rod cells in the retina and is most frequently due to degeneration of the retina as in retinitis pigmentosa or, more rarely, to deficiency of vitamin A.

PAIN

Pain in and about the eyes may come from a multitude of causes, some due to ocular disease and others not in any way related to the eyes. Pain may be unilateral or bilateral. It may be aching, boring, sharp and stabbing, scratchy, burning, or itching in character.

A *sharp stabbing pain* results from a lesion of the epithelium of the cornea and is often followed by a scratchy sensation. It is the characteristic pain of a foreign body on the cornea or lodged under the upper lid scratching the cornea. The scratchy sharp pain is accompanied by profuse lacrimation and severe photophobia.

A patient, usually a young married woman, frequently complains that she is awakened every night between 2 and 3 A.M. by a sharp, very

severe knife-like pain in one eye. The pain lasts ten to fifteen minutes and during this time the eye also feels scratchy. When the pain is gone, she falls asleep again and has no trouble the rest of the night. The next morning when she has the eye examined, the physician finds nothing to account for her symptoms and passes the episode off as of no consequence. Such patients sometimes go from physician to physician until finally one recognizes this sequence of events as the characteristic symptomatology of *recurrent erosion of the cornea*. Usually, some weeks or months before, the eye may have been scratched by a baby's fingernail or other foreign body. The abrasion probably healed promptly. However, such abraded areas may remain roughened and the epithelium may not grow securely to the basement membrane. Thus, when the lids are closed in sleep, the epithelium of the lid and that of the cornea may grow together. A slight movement of the lid in sleep then rips off the piece of cornea, thus producing the characteristic chain of events. Duration of the pain is only ten to fifteen minutes because the wound heals rapidly. Simply instilling boric acid eye ointment liberally at bedtime for several consecutive days heals this lesion. Tetracaine (Pontocaine) drops instilled during the height of the pain produce immediate relief. Recurrent corneal blebs may produce similar symptoms.

The so-called ether burn of the cornea, occurring when a patient wakes up from general anesthesia with a severely painful, scratchy, photophobic eye, is not an ether burn at all but an *abrasion of the cornea* caused by brushing the cornea inadvertently or else by allowing the lids to remain partially open and thus drying and macerating the cornea. Use of tetracaine (Pontocaine) and a patch relieves pain until the cornea is healed.

Burning of the eyes, aggravated by tobacco smoke in the air and sometimes accompanied by scratchiness and photophobia, is usually due to dry eyes (keratitis sicca). This condition is often associated with a dry cottony mouth, sour stomach, constipation, and, usually, with arthritis. It is caused by a systemic alteration in the production of glandular fluids on the serous surfaces of the body. Tear secretion, as tested by Schirmer's method of inserting a strip of filter paper over the lower punctum, will be absent or minimal in a five-minute test period. Fluorescein will stain innumerable minute areas of epithelial erosion of the corneas, which are visible only by biomicroscopic examination. The medication used is artificial tears, an isotonic solution of methyl cellulose (Isopto-Alkaline),

which is effective in 98 per cent of patients. The other 2 per cent may be helped by using a preparation of their own blood serum made under sterile conditions.

Itching of the eyes almost invariably denotes an allergic condition of the eyelids or conjunctivae. Pollens, cosmetics, house dust, and animal dandruff are the most common causes. Two diseases of the eyelids cause itching: (1) angular conjunctivitis and (2) vernal conjunctivitis. The former, an infection of the lids and conjunctivae caused by a diplobacillus, frequently occurs in aged people and is manifested by a distressing itching of the lids accompanied by fissuring at the outer canthi. It responds well to 1/3 per cent zinc sulfate drops administered four times daily for about a month. People with vernal conjunctivitis have a well-known way of rubbing their itching eyes by grinding the heel of the hand into the orbit. If the examiner everts the upper lids, he will see large cauliflower-like vegetations of vernal catarrh. Treatment with hydrocortisone or prednisone drops is effective.

The severe pain of acute glaucoma has been mentioned. Chronic simple glaucoma does not usually cause pain in the eyes. The pain of iritis is much less severe. A patient who has optic neuritis or retrobulbar neuritis often complains of pain when the eyes are moved. Scleritis causes a severe, deep, orbital pain which is aggravated by turning the eyes. This disease not infrequently accompanies rheumatoid arthritis and may develop in a very severe form in arthritic patients who have been treated with steroids for a long time and who have had the hormone withdrawn too rapidly. The treatment consists of

either systemic or subconjunctival administration of steroids.

A patient may periodically experience *very severe pain* deep in one orbit, which lasts one to two hours. These attacks usually occur in the spring and fall and cause excruciating pain which is generally at its worst during the night. Each pain rises rapidly to peak intensity and is accompanied by redness of the eye, lacrimation, stuffiness of the corresponding side of the nose, and, sometimes, by constriction of the homolateral pupil. Such a patient, of course, has histaminic cephalgia or so-called cluster headaches.

Other types of pain which may be in the vicinity of the eyes include the *scalp* pain of temporal arteritis, the characteristic *burning* pain of herpes zoster, and the *electric-shock* pains of trigeminal neuralgia. Patients with an intracranial aneurysm may have severe pains above one eye accompanied by Horner's syndrome on the same side.

Finally, there is a little known unilateral orbital pain some people experience when the nasal mucosa at the ostia of the nasal sinuses is congested or when the turbinates lie in contact with congested mucosa. Such pain is often present on awakening, may be aggravated by consumption of alcohol the night before, and can be prevented by lying at night with the painful side of the head turned up. Nasal decongestants often relieve this headache promptly.

Milder forms of pain are occasionally the result of uncorrected refractive errors and, sometimes, of uncorrected muscle imbalance of a mild degree. Large amounts of muscle imbalance do not usually cause ocular pain.

HYPOGLYCEMIA, with extensor rigidity of the extremities, coma, and acidosis, can occur as a result of intoxication with Solox, a paint solvent.

Solox, consists principally of methanol and ethyl alcohol and is often ingested by chronic alcoholics in the southern states. Many persons drink this fluid repeatedly with no ill effects. However, occasional patients are hospitalized because of coma, blurred vision, cramping abdominal pain, or burning of the eyes.

Physical findings include foul breath and chest rales like those of hydrocarbon or aspiration pneumonitis. Mania, convulsions, widely dilated pupils, generalized flaccidity, decreased gag and cough reflexes, loss of deep tendon reflexes, or extensor rigidity of hypoglycemia may be noted.

The carbon dioxide combining power and blood sugar concentration are low; blood ketones and lactate are increased.

Treatment includes: (1) correction of acidosis by intravenous administration of 2 per cent sodium bicarbonate solution; (2) reversal of hypoglycemia by intravenous infusion of hypertonic dextrose at four- to six-hour intervals for the first twenty-four hours; and (3) supportive care, including antibiotic therapy if aspiration has occurred. Pressor agents may be needed to combat shock.

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Care of the Patient with a Colostomy

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THERE IS MUCH MISUNDERSTANDING and misinformation relative to the status of the patient with a colostomy, and I hesitate to admit that much of this misinformation originates with physicians. Far too many doctors feel that a colostomy is a dreadful contraption that must not be considered for a patient except as a last resort. The truth of the matter is that a well-functioning colostomy is a wonderful device that makes it possible for people with serious illnesses and malignant tumors to be restored to health. These people can live relatively normal lives and can be economically independent and socially acceptable. Experience in caring for a large number of patients for many years has convinced me that an intelligent and cooperative patient does not feel that his colostomy is much of a handicap. However, we cannot expect all patients to be intelligent and cooperative, but we should expect every doctor who assumes responsibility for the care of patients who need this type of surgery to equip himself with the necessary information on the subject. Unfortunately for the patients, too few physicians have shown enough interest in colostomy problems in the past. A surgeon may perform an excellent bowel resection and provide the patient with a good anatomic colostomy, but, if that patient is not given proper instructions regarding the care and function of the colostomy, he soon is in trouble. He becomes miserable until an attempt is made to help him adjust to his new way of life. By that time, some patients have become depressed and quite unable to cope with the problems involved. A planned method of approach by the physician before surgery, during the period of hospitalization, and during the period of convalescence usually pays big dividends in helping the patient adjust to his new situation and to become rehabilitated in his family and outside environments.

When a patient learns that he has a very serious illness which often is due to a cancerous tumor, the blow is hard to take. Add to this trauma the knowledge that a colostomy must be

performed and that he will have to accept a complete change in his bowel elimination and the shock is often overpowering. At times, the effect on the patient is so serious that he may refuse surgery altogether. In other cases, the patient may become depressed and feel that his future will be dark and dismal. It is at this point that an understanding and well-informed physician can do a tremendous amount of good. The choice of words used in describing a colostomy is very important. A colostomy should never be referred to as "an opening in the side." This expression came into use about 1800 when the first lumbar colostomy was performed by Callisen¹ in Copenhagen. To my knowledge, no one has performed a "side" colostomy since the 1890's. A few minutes devoted to an explanation of how a colostomy works and how it can be regulated, augmented by a few well-chosen case histories of persons who are completely rehabilitated, does much to restore the patient's equilibrium and implant a feeling of hope and confidence. Merely to tell a patient that the rectum must be removed and that an artificial opening will be made on the abdomen is, to my mind, a cruel approach and must produce frightening thoughts in patients.

Much has been written in recent years on this subject. Lay persons as well as physicians have become aware of the gravity of this problem and have taken an active part in the educational program for physicians and patients. In some cities, clubs have been formed to help in the rehabilitation of colostomy patients. These organizations have done much to lessen the load of the physicians and to improve the mental attitude of the patients. They have also made available much information concerning newer techniques and appliances which may be of use to colostomy patients.

Each doctor must approach this problem in his own way. However, since the ultimate goal is the same in each case, namely, a well-adjusted and rehabilitated patient, certain basic principles must be observed. I will attempt to describe our approach in the handling of these patients, since we feel that the end results have been uniformly good. When we diagnose cancer of the

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rectum or any other disease requiring a permanent colostomy, we explain that the surgery will entail construction of a new opening, which will serve very satisfactorily and with little inconvenience to the patient. We assume a very optimistic attitude and try never to instill a feeling of doubt or fear in the patient's mind. We are quite positive in our approach and, if the patient manifests some real anxiety, we suggest that we will be glad to bring in a patient who has a colostomy and who is happy with it. We try to forewarn the nurses on the hospital floor where the patient is to be admitted so that they will assume an optimistic attitude toward the patient and his illness. A thoughtless nurse can destroy all of the confidence the physician has built up in the patient. We have had several bitter experiences resulting from tactless remarks about those "awful" colostomies. Some nurses offer unsolicited sympathy to these patients without realizing the damage they are doing.

After surgery, these patients are prone to be apprehensive and fearful of their new status. We make every attempt to bolster their morale and, on the day that the colostomy is opened, we explain that the first few times the colostomy functions we are unable to predict whether the stool will be well-formed, soft, or watery. We state that if a watery stool should occur and soil the bedclothes, it is not cause for alarm or fear that this condition will continue. We ask the nurses to be extraordinarily helpful in keeping these patients clean in order to avoid unnecessary embarrassments. Usually, the first movement will be well-formed or soft. With the advance warning we have given, the patient is happily surprised and becomes quite satisfied with his colostomy. After several days our patients are told that it would be well to start caring for the colostomy themselves, since they will want to be independent when they go home. It is interesting to see how well most patients accept this assignment soon after surgery. We like to impress upon our patients the fact that they should not expect to have others care for their colostomy when they are at home.

I must admit that there are healthy differences of opinion concerning the patient's care from this point on. Breidenbach and Secor,² in an excellent paper published in the *American Journal of Surgery* in January of this year, state that a patient should be taught to irrigate his colostomy about the tenth day after surgery. In this program, we do not concur. We feel that a patient will be in a much better position to irrigate and to appreciate the value of irrigation after he has learned more about the functioning of and care

of the colostomy before irrigations are started. When our patients leave the hospital, they are given a supply of dressings and are told exactly how to take care of the colostomy. They are advised to take tub baths and are told that a soft wash cloth can be used directly on the stoma. They are given a prescription for paregoric in case the bowels move too often and are given some insight into the dietary regime. This I will discuss subsequently. The patients are told to report to the office at the end of two weeks. At that time, they are interrogated in detail as to the behavior of the colostomy. Not infrequently, we have a patient who states that his colostomy has given him very little trouble. The bowel moves once a day, usually on arising in the morning or just after breakfast. These patients need very little further instruction. Irrigation would serve only to complicate the life of the patient and is totally unnecessary. The other patients whose bowels move several times a day or at erratic intervals are taught a very simple method of irrigation. An Asepto syringe, a catheter, and lubricant are all that are needed in the way of equipment. We demonstrate various types of irrigating appliances, but most of our patients are well satisfied with the simple procedure. I am not surprised that many doctors state that a certain method of irrigation, and that alone, is the proper procedure. Nor am I surprised when many patients come to me with their ideas of the proper way to irrigate a colostomy. The truth of the matter is that there are many ways of doing it, some of which work well for one patient while results are not the same for others. If a patient can irrigate and empty his colon in a period of thirty to forty-five minutes and if he can remain clean for twenty-four to forty-eight hours, this function is being performed satisfactorily. The important point is that the surgeon who performs the operation should supervise the education of the patient.

There are many appliances on the market for patients who have colostomies. We do not feel that an appliance is necessary for an intelligent and cooperative patient. If the bowel is emptied well, with or without irrigation, a small piece of gauze under an elastic abdominal support should be all that is required. When a patient wears a bag or a plastic pouch, it is quite obvious that he is not doing well in emptying his bowel at stated intervals. We have a few patients who, in spite of good colostomy care, absolutely insist on wearing a ring and plastic cover for their own self-assurance. We do not feel that the point is worth arguing. We discourage use of colostomy belts, bags, domes, and other bulky appliances.

The subject of diet is extremely important for the patient with a colostomy. It is very easy for such a patient to become a dietary cripple. We do everything possible to prevent this occurrence. Our patients are told that they will be able to eat essentially the same foods as they ate before surgery. We sincerely believe that there are very few foods which influence the function of the large bowel. We believe that the transportation of feces in the colon is influenced more by the neuromuscular mechanism, which depends on bulk and fluid, and by the emotional status of the patient than by any other factors. Our patients are told to eat everything, but we explain that they may find that one or more foods will cause some trouble. If a patient decides that his colon is functioning improperly because of a certain food, it is well to omit that particular item from the diet. In our experience, most colostomy patients have one or two foods from which they abstain, but, for the most part, the diet is extremely liberal and all inclusive. It is true that some foods, such as beans, cauliflower, and cabbage produce more gas than others. This is just as true in patients without colostomies. Common sense should dictate that these foods be avoided as much as possible. Highly spiced foods may produce an increased amount of gas. Each patient must decide whether this is true in his particular case. The importance of restrict-

ing the diet in patients with colostomies has been unnecessarily overemphasized in the past. It is high time that this practice be discontinued. The patient with a colostomy has been penalized enough without being unnecessarily burdened with a restricted diet.

This discussion would not be complete without further comments on the value of colostomy clubs. We are all cognizant of the value of group therapy in emotional and other psychiatric disturbances. The colostomy club acts as a group therapy class. Patients with common problems get together for discussion and to learn how best to handle their individual problems. When a person with a new colostomy sees other people who are entirely rehabilitated and who are leading normal lives, it cannot help but raise his morale. In St. Paul, we have a colostomy and ileostomy club which has performed outstanding service in visiting patients both pre- and post-operatively and in helping during the period of readjustment. I heartily recommend the formation of these clubs in all medical centers in the country. The life of a patient with a colostomy need not be a restricted and unhappy one. With proper education and with the help of an understanding physician, these patients can lead relatively normal lives. One need only to attend a meeting of a colostomy club to appreciate the accuracy of this statement.

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AFTER ABDOMINAL HYSTERECTOMY, early feeding decreases the need for intravenously administered fluids but increases nausea, vomiting, distention, and gas pains. Only 0.39 liters of intravenous fluids were given on the third post-operative day to 38 patients fed a solid, high-protein diet immediately after total abdominal hysterectomy, whereas administration of 0.89 liters was necessary in 41 patients managed in the usual manner. Nausea and vomiting occurred in 18 of the women fed the special diet but in only 8 of the controls. Moderate or severe abdominal distention was observed in 3 of the control group and 5 of the special diet group. Only 10 control subjects had moderate or severe gas pains, whereas 15 patients fed immediately after operation had such distress. More thorough preoperative explanation of the regimen to the subjects might have led to better results, since some opposition to early feeding expressed by relatives and some of the nursing staff may have dismayed the patients.

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Comparative Clinical Pharmacodynamic Evaluation of Newer Hypotensive Drugs

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ALTHOUGH THE CAUSE OF HYPERTENSION cannot be established in the great majority of patients with this malady, they all have in common an abnormal increase of the peripheral vascular resistance at the arteriolar level. This is the only one of the factors known to influence the level of arterial blood pressure that is consistently abnormal. Other factors—blood volume, cardiac output, arterial elasticity, and blood viscosity—become abnormal but not consistently and only in complicated and advanced forms of hypertension.

There is considerable controversy concerning the importance of humoral and neurogenic factors in relation to the increased peripheral vascular resistance present in hypertension. So far, however, only the neurogenic factor, manifested by an excessive increase of the sympathetic tone, can be modified sufficiently by therapeutic means to lead to reversibility of the hypertension or postponement of the organic sequelae.

Until recently, chemotherapy directed against the excess activity of the sympathetic nervous system was greatly handicapped by the inadequacy and nonspecificity of the drugs available. The dissatisfaction with the results of medical therapy led, therefore, to rapid and widespread acceptance of surgical therapy when sympathectomy was shown to be effective in reducing hypertension and in abolishing secondary symptoms and sequelae.

When eventually large statistics of surgically treated patients became available, their comparison with adequate control observations revealed, however, to quote Page, "a few brilliant successes, some patients definitely . . . benefited and some not at all."

A renewed chemotherapeutic attack upon hypertension has been under way since the end of the last war due to the discovery of a number of drugs of sufficient potency and specificity to

affect the hypertensive state both as produced experimentally and as encountered in man. The ever increasing number of these drugs, their pronounced variation in chemical structure, pharmacodynamic activity, and potency of both specific and nonspecific character have brought with them a similarly high variation in clinical applicability. This often confusing and potentially hazardous situation requires a critical appraisal at frequent intervals. This is the reason for the following review, which attempts a comparative clinical pharmacodynamic evaluation of the most important antihypertensive drugs.

DEFINITION AND CLASSIFICATION

Hypotensive agents can be classified in a general manner into those that influence the peripheral resistance by: (1) direct inhibition of the vasomotor center, (2) blocking of autonomic ganglia, and (3) adrenergic blocking at peripheral sympathetic nerve endings. Such classification is, however, misleading unless it is understood to reflect merely the predominant action of a particular hypotensive agent. Many act simultaneously at different sites within the sympathetic nervous system (table 1). Another matter of terminology and inherent implication of action deserves discussion. Much has been made until very recently of the differentiation between the "sympatholytic" and the "adrenolytic" effects of some of these hypotensive agents. The first supposedly indicates a blocking of sympathetic nerve activity, the last a blocking or neutralization of circulating adrenergic substances, such as epinephrine and norepinephrine. It has been demonstrated conclusively that such differentiation is artificial and that it merely reflects the predominating activity of a hypotensive drug which, almost without exception, can be shown to have complex activity. In general, the sympatholytic action is less marked than the adrenolytic.

The broader term "adrenergic blockade" was, therefore, recommended by Nickerson for the description of the activity of these agents, and it has found general acceptance. It is, however, often used to describe the action of hypotensive

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TABLE 1
SITE AND DEGREE OF EFFECT OF HYPOTENSIVE AGENTS

Drug	Ganglionic	"Sympatholytic"	"Adrenolytic"	CNS	Humoral	Other
1. Dibenamine	0	+	++	++	0	
2. Piperoxan	0	0	++	+	0	
3. DHE alkaloids	0	++	+	+	0	
4a. Priscoline	0	++	+	+	0	
b. Regitine	0	+	+ (+)	(+)	0	
5. Hydralazine	0	++	+	+	+	
6a. TEA	+					
b. C ₅	++	0	0	0	0	
c. C ₆	+++					
7. Thiophanium derivative	(+)	+	+	+	0	
8. Veratrum alkaloids	0	0	0	?	0	Card?
9. Rauwolfia	0	0	0	+	0	.

drugs that decrease peripheral resistance by mechanisms other than adrenergic blockade. Obviously, such terminology is again misleading and should be abandoned in favor of the general term of "hypotensive action."

SITE OF EFFECT AND CHEMICAL STRUCTURE

Table 1 demonstrates the site of action of the hypotensive drugs to be presently discussed. Their degree of activity is characterized by the use of symbols. A consideration of the chemical structure and its relation to the pharmacologic activity reveals striking differences both in chemical structure and pharmacodynamic activity of the drugs under consideration.

Dibenamine, one of the most potent and most highly specific adrenergic blocking agents, is a β -haloalkylamine related to the nitrogen mustards. Related to it are its benzyl-methyl phenoxethyl derivative (*Dibenzyline*) and piperoxan (*Benodaine*). The adrenergic blocking activity of these drugs depends on the basic chemical structure β -phenylethylamine (figure 1) which they have in common. The specific adrenergic blocking activity of these and related tertiary amines presupposes a particular chemical reactivity with the formation of highly active intermediate compounds.

The next group of agents showing adrenergic blocking action is made up of structurally complex substances. They are obtained by hydrogenation of the three alkaloids contained in ergotoxine: namely, ergocornine, ergocristine and ergokryptine. This process of reduction increases the adrenergic blocking effect of these alkaloids

and decreases at the same time their ability to stimulate smooth muscle. These three alkaloids, referred to subsequently as *DHE alkaloids*, have in common a dimethylpyruvic acid, an amino group, and proline as the protein molecule. Their difference in adrenergic blocking activity appears to be related to the difference in the type of amino acid present in their structure.

However, this group, available for clinical use under the name of *Hydergine*, does not exhibit as exclusively an adrenergic blocking activity as *Dibenamine*, since it shows also direct central effect. This additional action was overlooked for some time but is now well recognized as being responsible to a considerable degree for the so-called sympatholytic effect. The duration of activity of these agents is moderate.

Another group of chemically related hypotensive agents, consisting of *Priscoline* and *Regitine* exhibits mixed adrenergic blocking and central activity. The chemical structure is basically that of imidazoline and as such is related to histamine (figure 2). This relationship is considered a possible explanation for the many histamine-like effects of *Priscoline* and *Regitine*.

There is some controversy as to whether *Priscoline* is more strongly sympatholytic or adrenolytic. Species differences may account for the discrepant data obtained in animal experiments. In man, the direct depression of sympathetic nerve activity appears more pronounced than the adrenolytic effect. In addition, a direct central influence is also often evident. The duration of activity of *Priscoline* is quite short, though slightly longer than that of piperoxan. *Regitine* dis-

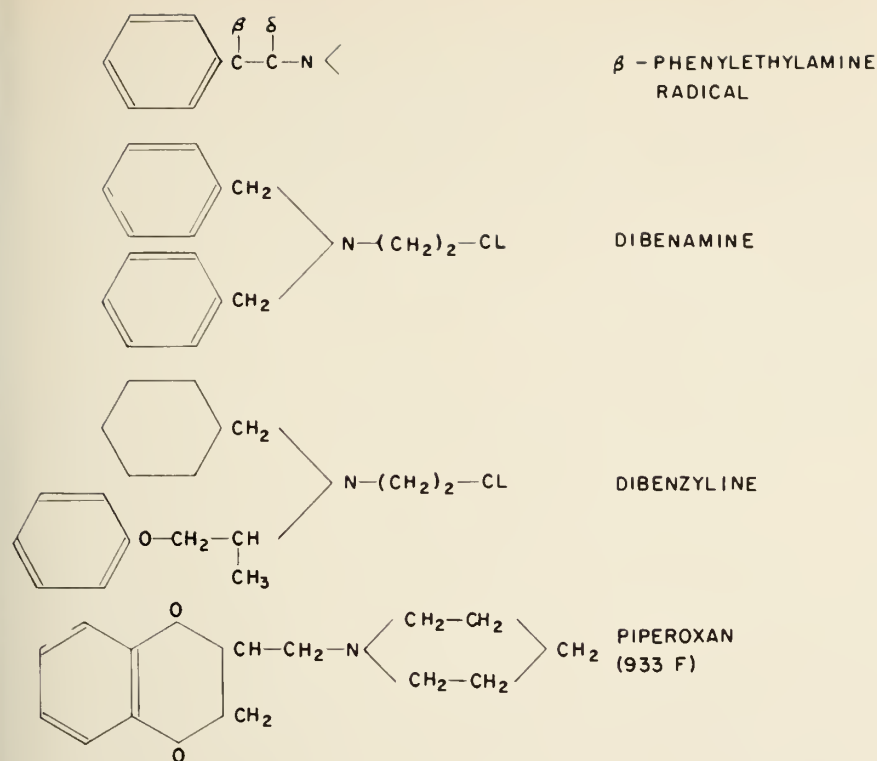


Fig. 1. Chemical structure of Dibenamine, Dibenzylamine, and piperoxan shown to be basically the same as β -phenylethylamine.

plays a more pronounced adrenolytic action than Priscoline and one of longer duration than piperoxan.

The next hypotensive agent of importance is *hydralazine*, an abbreviation for 1-hydrazinophthalazine, available clinically under the name of Apresoline (figure 3). This drug shows mixed activity with only very slight adrenolytic and moderate sympatholytic activity. The main site of its effect lies centrally, probably at the hypo-

thalamic level. It appears further to be the only hypotensive agent available which, according to early and as yet inadequately confirmed reports, blocks pherentasin, a humoral vasopressor substance demonstrated in cerebral extracts.

We come next to the ganglionic blocking group of quaternary ammonium compounds, *tetraethylammonium* (TEA), *pentamethonium* (C_5) and *hexamethonium* (C_6). Chemically, all three show a striking relation to acetylcholine (figure 4).

It is suggested that the pharmacologic effect of these agents which block both sympathetic and parasympathetic activity at the ganglionic level is due to interference with acetylcholine activity. They are highly potent hypotensive drugs, with potency weakest in TEA and most marked in C_6 . Newer related compounds such as *pendiomid* and *pentolinium* (pentapyrrolidinium) have been introduced recently into clinical usage. The most promising is pentolinium tartrate marketed as Ansolysen. This whole group of agents will be referred to subsequently as the methonium group.

Of entirely different chemical constitution is *Arfonad*, a Thiophanium derivative. Pharmacodynamically, it resembles TEA with its ganglionic blocking effect but differs from it by the additional possession of moderate adrenergic blocking and central activity.

The next important group of hypotensive

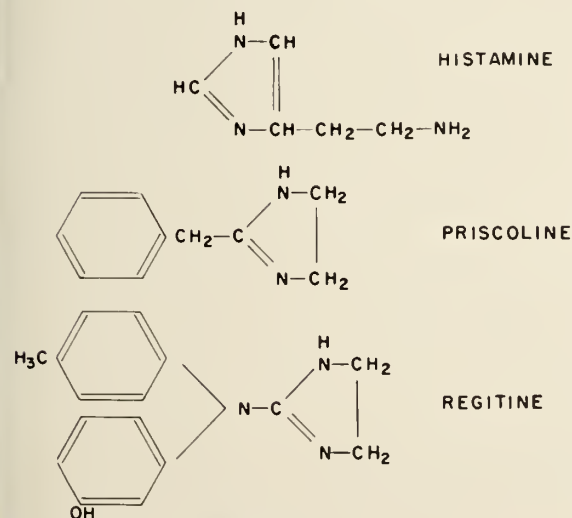


Fig. 2. Chemical relationship of Priscoline and Regitine to histamine.

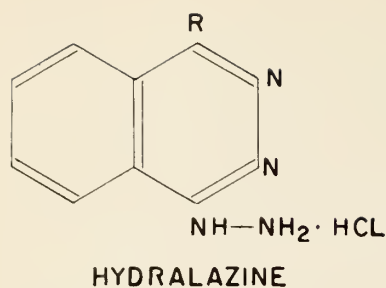


Fig. 3. Chemical structure of hydralazine.

agents is derived from *Veratrum viride*. Several alkaloids have been extracted, some in fairly purified form. These alkaloids and even their crystalline fractions are very complex compounds. Chemically, some of them are esters, others alkamines. The latter have been found to have sterol structures. *Veriloid* and *protoveratrines A and B*, the latter under the name of *Veralba*, are the two most extensively studied fractions and have come into general clinical use.

Although *Veratrum* is an almost ancient drug, the mechanism of its hypotensive action has been elucidated only very recently. Because of the bradycardia appearing in association with the hypotension and because of the lack of any demonstrable effect upon any part of the intact sympathetic nervous system, it was thought for a long time that the hypotensive activity of *Veratrum* alkaloids was in some manner tied up with the Bezold reflex, whose afferent fibers arise in the myocardium of the left ventricle. However, cross circulation experiments in dogs in whom head and body circulation were completely separated except for intact nervous communication have shown that hypotension in the body can be obtained when *Veriloid* or *Protoveratrine* is injected into the head circulation alone and is then not accompanied by bradycardia. Since in man these agents similarly cause hypotension without significant bradycardia, it seems reasonable to assume a central (hypothalamic) site of action in man. More recently, experimental work has yielded data suggesting that the hypotensive effect may be mediated via the carotid sinus.

Another hypotensive agent has recently been introduced into clinical use and has become established quickly as one of the most widely applicable drugs for the treatment of hypertension. It is a mixture of alkaloids extracted from the Indian plant *Rauwolfia serpentina*. They

have been broken down into several purified fractions, of which *reserpine* was found to be one of the most active. The site of action of this agent appears to be limited to the hypothalamic region. It does not block ganglia nor is it adrenolytic or sympatholytic. The basic chemical structure of reserpine alkaloids as well as many of the pharmacodynamic effects resemble those of yohimbine, an ancient "sympatholytic" drug.

PHARMACODYNAMIC MANIFESTATIONS OF HYPOTENSIVE ACTIVITY IN MAN

When pharmacologic and pharmacodynamic data obtained with hypotensive agents in animal experiments are applied to man, considerable difficulties may be encountered. Most important are those related to species differences. These are a familiar phenomenon to the experimental pharmacologist but tend to escape the attention of the clinician who is too eager to translate pharmacologic findings into clinical usage. These considerations must prevail as long as basic experimental work in animals is required for the study of drugs. In the instance of hypotensive agents, this means the use of common carotid occlusion, central vagal stimulation, stimulation of the superior cervical ganglion of the cat, and the nictitating membrane. However, certain procedures, such as cold exposure, the Valsalva maneuver, tiltback and orthostatic maneuvers, and the digital inspiratory constrictor response, allow even in the moderately ill patient the observation of vasopressor stimulation and the antagonism by hypotensive drugs. Even the blocking effects upon the action of adrenergic drugs, such as epinephrine and norepinephrine, and of the cholinergic substances can be studied in man with safety. Furthermore, newer methods of renal clearance, cardiac and coronary sinus catheterization, and cerebral blood flow studies permit the observation of the effect of hypotensive drugs on the most vital compartments of the circulation in man.

Thus, while data obtained with these methods are not able to pinpoint all of the effects of hypotensive agents in man, considerable information is gained regarding the nature of the desired specific action and any undesirable side effects of these drugs.

There are, however, some fallacies inherent in

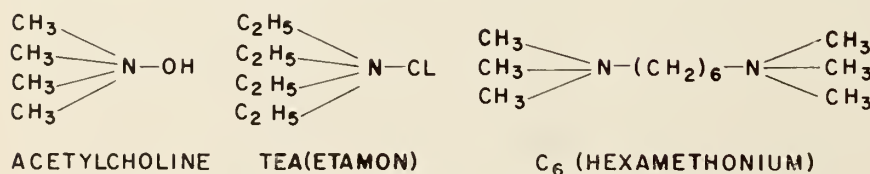


Fig. 4. Chemical relationship of TEA and hexamethonium to acetylcholine.

TABLE 2
COMPARATIVE VASOMOTOR RESPONSE TO HYPOTENSIVE AGENTS

Drug	Rate	Blood pressure of Normals	Hyper-tensives	Orthostatic hypotension	Cold pressure	Valsalva overshoot	Tiltback overshoot	Arterenal BP	PR	Epinephrine BP	PR
1. Dibenamine	▲	±	▼	+++	TOTAL BLOCK			▼	0	▼	0
2. Piperoxan	▲	±	0▲	0	0	—	—	▼	▲	▼	±
3. DHE alkaloids	▼	0▼	▼	+	PARTIAL BLOCK			0	0	0	0
4. Priscoline	▲	±	▲	+	PARTIAL BLOCK			0	0	0	0
5. Hydralazine	▲	▼	▼	+(+)	NEAR TOTAL BLOCK			▼	▲	▼	0
6a. TEA			▼	+							
b. C ₅	▲	▼	▼	+(+)	PARTIAL BLOCK			▲	0	▲	0
c. C ₆			▼	++							
7. Thiophanium derivative	▲	▼	▼	+(+)	Block	—	—	▼	0	▼	0
8. Veratrum alkaloids	▼	±		+(+)	0	0	0	▼	0	▼	0
9. Rauwolfia	▼	±	▼	0	0	0	0	0	—	0	—

testing the efficacy of these drugs in man. These must be kept in mind when pharmacodynamic data are used as a basis for therapeutic application. First, the response of a given patient to a drug administered intravenously in the course of an acute experiment is not necessarily the same as during a period of prolonged maintenance. Developing tolerance on one side and cumulative action and inherent side effects on the other side may cause decisive differences that can negate all predictability of a therapeutic response based on preliminary testing. Second, even in the acute experiment, the observed results of vasomotor and general hemodynamic responses to drugs that affect the sympathetic nervous system are notoriously variable. This may be due in any given instance to the degree of initial sympathetic constrictor tone, the degree of organic vascular disease present, the extent of blockade achieved, and the resultant blood pressure reduction. It is with these limitations in mind that we present in the following tables a survey of the comparative vasomotor response to these hypotensive agents (table 2), their effect on renal dynamics (table 3), and their over-all effect on the circulation through various vascular compartments (table 4).

It appears superfluous to elaborate on all the data assembled and presented in these tables. Most of them are self-explanatory. However, those germane to a discussion of criteria for the most desirable hypotensive drug deserve emphasis.

CRITERIA FOR DRUG SELECTION

The criteria to be fulfilled by the ideal hypotensive drug may be listed as follows:

1. High specificity.
2. Blocking of strong vasopressor stimuli.
3. Significant reduction of blood pressure.
4. Favorable effect upon symptoms and signs of hypertension.
5. No undue increase of pulse rate.
6. No impairment of circulation through kidney, brain, and coronary arteries.
7. Easy, preferably oral, administration.
8. High therapeutic index.

In regard to *specificity*, if, under this term, exclusive influence upon the sympathetic nervous system with resultant reduction of the blood pressure is understood, then no drug presently available can be said to possess this character-

TABLE 3
COMPARATIVE EFFECT OF HYPOTENSIVE AGENTS ON RENAL FUNCTION

Drug	Glomerular filtration	Renal blood flow	Filtration factor	Urine volume
1. Dibenamine	initial▼initial	▼	variable	—
2. DHE alkaloids	initial▼initial	▼	0	▼
3a. Priscoline	▼	▼		
b. Regitine				
4. Hydralazine	▲▼	▲	▼	▲
5a. TEA				
b. C ₅	▼	0▼	variable	▼
c. C ₆				
6. Thiophanium derivative	▼	▼	—	▼
7. Veratrum alkaloids	▼	▼	—	▼
8. Rauwolfia	±D	±	±	—

D for dog

TABLE 4
COMPARATIVE OVER-ALL EFFECT OF HYPOTENSIVE AGENTS
ON CIRCULATION THROUGH VARIOUS VASCULAR AREAS

Drug	Peripheral	Coronary	Renal	Cerebral	Splanchnic
1. Dibenamine	▲	0	▼	▲ NH	—
2. DHE alkaloids	▲	▲	▼	▼▲	▼
3. Priscoline	▲	▲ D)	▼	▲	—
4. Hydralazine	▲	0▲	▲	▲	—
5a. TEA	▲		0▼	NH	
b. C ₅	▲	0▲	0▼	▼0	▲
c. C ₆	▲		▼		
6. Thiophanium derivative	▲	—	▼	±N	—
7. Veratrum alkaloids	0	0	▼	—	▲
8. Rauwolfia	—	0	0	—	—

D for dog
N for normotensive man
H for hypertensive man

istic, with the possible exception of the Veratrum and Rauwolfia groups.

The *blocking of strong vasopressor stimuli and significant reduction of the blood pressure* are interrelated. Table 2 demonstrates that those drugs that, in a potent manner, block pressor stimuli from which one likes to protect the over-reacting hypertensive patient, usually cause moderate to severe orthostatic hypotension. This effect is not limited to the ganglionic blocking agents but holds for all drugs that show moderate to marked hypotensive effects. It is so excessive in the case of Dibenamine that this drug cannot be used for the treatment of hypertension and so pronounced in the case of the methonium group that treatment must be administered with utmost caution.

An attempt to select a drug that possesses the desirable property of slowing rather than accelerating the *pulse rate* yields only a few, the DHE, Veratrum, and Rauwolfia alkaloids. In mean, this effect is considerable only with the Rauwolfia group and minimal and inconstant with the other two. Fortunately, those hypotensive drugs in clinical use that accelerate the heart rate do so only rarely to an excessive degree.

Since of all circulatory compartments, the *renal* circulation maintains the most intimate and interdependent relationship to hypertension, there is ample reason for careful evaluation of the effect of hypotensive agents upon the dynamics of the renal circulation. The ideal effect would be one of increased renal blood flow regardless of whether renal involvement plays a primary or secondary role in hypertension. As evident from

table 3, only one drug, hydralazine, has been demonstrated to possess this effect. All the other potent hypotensive drugs tend to depress renal function, all the more so the higher the initial blood pressure and the more severely disturbed the renal function is prior to treatment. This is most pronounced in the malignant phase of hypertension with uremia and least striking when hypertension is moderate and renal function only slightly disturbed.

Observations involving the prolonged use of hydralazine have, however, shown that the initially increased renal blood flow may eventually return to normal levels. Similarly, the initial reduction of the renal blood flow produced by the methonium group and protoveratrine tends also to disappear with prolonged use. This may explain the occasional increase in urinary output and drop of blood urea nitrogen observed clinically.

As regards the effect upon the other circulatory compartments, table 4 reveals no undue direct effect of any of the hypotensive agents under discussion upon the *coronary* circulation. A few have been shown in animals or man to be actually able to increase coronary blood flow to a slight degree. This is hardly of any clinical significance. The effect upon the *cardiac output* has been studied in the case of several hypotensive drugs. Some, like the DHE alkaloids and hydralazine, tend to increase the cardiac output, the first mainly by a centrally mediated increase of the rate, the latter both by this means and possible direct stimulation of the myocardium. The clinical significance of this is demonstrated by

the not infrequent occurrence of angina pectoris with or without preceding tachycardia and even of myocardial infarction in hypertensive patients with coronary disease treated with hydralazine.

Other hypotensive drugs, such as the Veratrum and the methonium groups, tend to decrease the cardiac output. It is not certain whether this is accomplished by direct depressive action upon the myocardium, as has been held for a long time in the case of Veratrum, or via splanchnic pooling and resultant decrease of venous return, as appears more recently documented for both the methonium and Veratrum group. This effect has actually proved of benefit to hypertensive patients in acute left ventricular failure.

In general, however, any precipitous drop of the blood pressure, particularly when associated with an increase of the pulse rate, may precipitate myocardial ischemia and even infarction. Thus, where concern for the integrity of coronary circulation is paramount, the use of drugs, such as hydralazine, the methonium group, and Veratrum alkaloids, must be particularly circumspect. The use of reserpine in combination with such agents should prove particularly advantageous in these circumstances by virtue of its ability to slow the rate and also to decrease the need for larger doses of the more potent hypotensive drugs.

Regarding the *cerebral* circulation (table 4),

fortunately, none of the drugs under discussion decreases cerebral flow. Many decrease cerebral resistance in line with the drop of the systemic blood pressure, but, again, as in the case of the hypertensive patient with coronary disease, the one with cerebrovascular involvement must not be subjected to precipitous reduction of the blood pressure, since this is bound to lead to severe decrease of cerebral blood flow.

Limited documentation is available regarding the effect of hypotensive drugs upon the splanchnic circulation. Undoubtedly, it participates with skin and muscle circulation to a considerable degree in the general relaxation of the peripheral vascular resistance, which is responsible for the reduction of the blood pressure.

As regards *administration*, table 5 summarizes data based, in addition to the basic pharmacodynamic properties, also on such factors as the speed of onset of activity, feasible route of administration, speed of excretion, duration of activity, cumulative effects, and development of tolerance. Extensive and carefully conducted clinical studies have shown that most of the hypotensive drugs now available leave much to be desired in terms of ease of administration.

The clinical applicability is further complicated by a variable incidence and degree of side effects (table 6).

The latter are not limited to systemic toxicity

TABLE 5

CRITERIA FOR DESIRABLE CHARACTERISTICS OF HYPOTENSIVE DRUGS AND RELATIVE STANDING OF THOSE NOW IN USE

Drug	Specificity	Blocking of vasomotor stimuli	Reduction of BP	Improvement of symptoms and of hypertension	Slowing of heart rate	Unimpaired blood flow			Easy administration		High therapeutic index
						Renal	Coronary	Cerebral	Parenteral	Oral	
1. Dibenzamine	No	Marked	Marked	-----	No	No	Yes	---	No	No	No
2. Dibenzyline	No	Slight	Slight	-----	No	---	---	---	---	Yes	Fair
3. Piperoxan	No	No	-----	-----	No	---	No ²	---	---	---	---
4. DHE alkaloids	No	Slight	Minimal	Minimal	Occas.	No	Yes	Yes	Yes	Yes	Yes
5. Priscoline	No	Slight	Minimal	-----	No	Yes	Yes	Yes	Yes	Yes	Yes
6. Regitine	No	-----	-----	-----	No	---	---	---	---	---	---
7. Hydralazine	No	Marked	Mod.	Yes	No	Incr.	Usually	Yes	Yes	Yes	Yes
8. Methonium group	No	Marked	Marked	Yes	No	No	Yes ¹	Yes ¹	Yes	Fair	Fair
9. Arfonad	No	Mod	Mod.	-----	No	No	---	---	Yes	No	Fair
10. Veratrum alkaloids	Yes?	Slight	Mod.	Yes	Occas.	No	Yes ¹	Yes ¹	No	No	No
11. Reserpine	Yes?	No	Slight	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

¹Except with precipitous drop of blood pressure.

²Associated with hypertensive crisis occasionally induced by piperoxan.

TABLE 6
CLINICAL APPLICABILITY AND SIDE EFFECTS OF HYPOTENSIVE AGENTS

<i>Drug</i>	<i>Peripheral vascular disease</i>	<i>Hypertensive vascular disease</i>	<i>Pheochromo- cytoma</i>	<i>Degree</i>	<i>Side effects Incidence</i>
1a. Dibenamine	+	+	++	Severe	Freq.
b. Dibenzyline	++	++	0	Mod.	Freq.
2. Piperoxan	0	0	+++	Mod.	Freq.
3. DHE alkaloids	++	+	0	Mild	Freq.
4a. Priscoline	+++	0	±	Mod.	Freq.
b. Regitine	+(+)	0	+++	Mild	Freq.
5. Hydralazine	(+)	++	0	Mod. Severe	Freq. Occas.
6a. TEA	(+)	(+)	+	Mod.	
b. C ₅	+	++	—	Mod.	Freq.
c. C ₆	+(+)	+++	—	Severe	
7. Thiophanium derivative	(+)	(+)	—	0	----
8. Veratrum alkaloids	0	++	0	Mod. Severe	Freq. Occas.
9. Rauwolfia	0	+(+)	0	Minimal	Occas.

but also frequently involve excesses of the inherent pharmacodynamic activity. Examples of the first type are the occurrence of a lupus erythematosus-like syndrome produced by the prolonged use of large doses of hydralazine and gastrointestinal intolerance observed with Dibenzyline and Priscoline. Examples of the second type are the unpredictable and, at times, unavoidable peripheral vascular collapse following the use of Veratrum drugs; the excessive central stimulation by Dibenamine, resulting in delirium and convulsion; unpleasant tremulousness after use of DHE alkaloids; severe depression occasionally seen with Rauwolfia; and accommodation paralysis noted with the methonium group.

These side effects do not affect the clinical applicability of these drugs in terms of their usefulness in peripheral vascular disease, hypertensive cardiovascular disease, and hypertension due to pheochromocytoma (table 6). Their respective place in the management of these conditions depends primarily on their site and degree of pharmacodynamic activity as seen in table 1. Thus, those drugs with markedly predominant adrenolytic action are best suited for the diagnostic and therapeutic management of crises due to a pheochromocytoma. Those with relatively strong, if not exclusive, sympatholytic action are most useful as peripheral vasodilators, while the ganglionic blockers tend to be useful only as hypotensive agents. Their predominant effect upon the blood pressure makes their use

for the treatment of peripheral vascular disease impracticable and often impossible even in normotensive patients. They can be employed, however, on a short term basis for the diagnostic evaluation of peripheral vascular conditions, such as the presence or absence of peripheral vascular spasm.

CONCLUSIONS

Evaluation of available hypotensive drugs in the light of the pharmacodynamic and clinical observations makes it obvious that no single hypotensive agent has yet been found able to fulfill all criteria of desirability. A careful selection of a combination of hypotensive drugs and the frequent addition of drugs counteracting their side effects are at present the best and only working solutions for the management of all but the mildest forms of hypertension. Such a selective order of hypotensive drugs is offered in table 7.

The choice is based on the consideration of all basic pharmacodynamic data in animal and man and the likely clinical response of patients in various phases of hypertensive vascular disease. It is recommended as a systematic approach to the medical management of hypertension and, as such, has proved of great practical usefulness in our experience. It may well be modified as better hypotensive drugs become available.

ADDENDUM

Since completion of this review, two new hypotensive drugs have become available, Ecolid

TABLE 7
SELECTION OF HYPOTENSIVE DRUGS FOR TREATMENT OF HYPERTENSION

<i>Hypertensive state</i>	<i>Initial Drug R</i>	<i>1</i>	<i>Additional drugs in order of choice</i>		
			<i>2</i>	<i>3</i>	
1. Mild, symptomatic	Reserpine	Usually	not	required	
2. Mod., with grade 3 fundi	Reserpine	Apresoline	Ansolsen	Protopratrine	
3. Mod. or severe, with					
a. Card. failure	Reserpine	Ansolsen	Protopratrine	Apresoline	
or					
b. Coronary insuff.	Reserpine	Apresoline	Protopratrine	Ansolsen	
c. Renal insuff.	Reserpine	Apresoline	Protopratrine	Ansolsen	
d. Cerebrovascular insufficiency	Reserpine	Apresoline	Ansolsen	or Protopratrine	
4. Acute hypertensive encephalopathy	i.v. Protopratrine	or Ansolsen	or Apresoline	or Reserpine	
5. Malignant phase					
a. Incipient	Reserpine	Protopratrine	Ansolsen	Apresoline	
b. Established					
1. renal insuff.	Reserpine	Apresoline	Protopratrine	Ansolsen	
2. card. insuff.	Reserpine	Ansolsen	Protopratrine	Apresoline	

(chlorisondamine dimethochloride) and mecamlamine, marketed as Inversine, a secondary amine (3-methylaminoisocamphane hydrochloride). Both are potent ganglionic blocking agents and, according to experimental and limited clinical

reports, behave much like the methonium group. Both have the suggested advantage of more complete absorption and Mecamlamine has, in addition, that of leaving renal blood flow undisturbed.

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Comments concerning this Section, criticisms, or suggestions for papers will be most welcome. Physicians are cordially invited to submit articles pertaining to pain for consideration. All inquiries and manuscripts should be sent to Dr. John S. Lundy, 102 Second Avenue Southwest, Rochester, Minnesota, or to the Editorial Department, THE JOURNAL-LANCET, 84 South Tenth Street, Minneapolis, Minnesota.

Management of Tic Douloureux

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PITFALLS beset the path of the medical practitioner in attempting to solve the problem of facial pain. One of the reasons is that the area which is usually affected is served by a number of different nerves. Among them are the trigeminal, some of the upper cervical roots, the glossopharyngeal, the great occipital, and, possibly, some ill-understood contributions from the sympathetic pathways.

With the great number of neuroanatomic structures possibly causing pain, go an even wider variety of etiologic agents. In 1940, Glaser¹ suggested the following classification of the disorders comprising what he called "atypical facial neuralgia":

1. Primary atypical facial neuralgia of unknown etiology.
2. Facial neuralgia secondary to such causes as herpes, abnormalities of the mandibular joints, convulsive disorders, nuchal myositis, and so on.
3. Atypical facial neuralgia produced by systemic diseases, such as allergy or psychoneurosis.
4. Atypical facial neuralgia secondary to infection or neoplasms in the region of the head and neck.

Unfortunately, many patients who have genuine atypical facial pain go from doctor to doctor forever undiagnosed and overtreated. Be-

cause ignorance of the pathophysiologic mechanism of many painful syndromes still prevails, their real distress is labeled a "psychosomatic reaction."

Nevertheless, among the host of painful conditions affecting the face and its surrounding structures, one syndrome is easily differentiated. It is called "tic douloureux" or "trigeminal neuralgia" and is manifested in the areas served by the trigeminal nerve. The description of the tics is so characteristic that the disease may be diagnosed by this means alone. The presence of the tics coupled with a completely negative neurologic examination is incontrovertible evidence for true trigeminal neuralgia.

The distinguishing features of tic douloureux are recurrent paroxysms of sharp, stabbing, and, occasionally, burning or searing pain in the distribution of one or more of the sensory branches of the trigeminal nerve. The single most outstanding peculiarity of this disease, which makes it easy to differentiate from other painful facial conditions, is the paroxysmal nature of the attacks. They are characterized by a lightning-like suddenness of onset, short duration (from a few seconds to a few minutes), rapid disappearance of the pain, and completely pain-free intervals between attacks. When the pain is in the ascendant, it is excruciating and almost unbearable. In the colorful words of Harry Lee Parker,² the sufferer from tic douloureux "looks miserable and haggard, and he has every reason to be so, for he has such a pain in his face that all the devils out of Hell might be tearing at it."

Trigeminal neuralgia is a disease of unknown etiology, undetermined pathology, and unexplained physiology. It occurs most commonly in

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middle or late life and is slightly more common in women. Usually, it is unilateral, but in 2 to 5 per cent of the cases, there is bilateral involvement.³ The second division of the trigeminal nerve is the most commonly involved; the first, the least often affected.

Because the pain is so severe, tearing of the eyes frequently accompanies it. The paroxysms of pain may occur every few minutes or the patient may go for days, weeks, or months completely pain free. The pain may prevent him from holding any job and even keep him from carrying out any of his normal daily activities. This is particularly true if so-called "trigger points" or "trigger zones" are present. These are areas of hypersensitivity, which, when touched or affected by motion, set off painful paroxysms. They are usually located on the face or inside the mouth. When they are part of the syndrome, it may be difficult or even impossible for the patient to wash, shave, speak, or eat. The face assumes a "masklike expression of . . . immobility. There is in this expression the hope of avoidance and the dread of recurrence."²

Avicenna was the first to differentiate this disease about 1000 A. D., but the first clear delineation of the syndrome is ascribed to Fehr and Schmidt in the latter part of the seventeenth century.⁴ Fothergill⁵ wrote a description of it in 1773 which remains unequalled to this day.

At times, tic douloureux affecting the third division of the trigeminal nerve is difficult to distinguish from glossopharyngeal neuralgia. This disease is probably identical in nature with trigeminal neuralgia but affects the throat rather than the face.³ Trigeminal neuralgia may occur in combination with glossopharyngeal neuralgia³ as well as in combination with a tic-like neuralgia of the great occipital nerve.⁶

The pathology of tic douloureux has never been elicited, although theories abound. Its onset in late middle life seems to offer evidence in favor of the theory that vasospastic ischemia of the gasserian ganglion accounts for the symptoms in at least some cases. Since the disease is never fatal and surgical removal of the gasserian ganglion is not performed, histopathologic studies are scarce. In the few that have been done, no histologic changes have been shown that would account for the disease.

A few conditions may mimic the syndrome and must be distinguished from it. Most important among these are acoustic neurinomas, which occasionally produce tic douloureux. A history of hearing loss, tinnitus, and findings of the neu-

rologic examination should help establish the correct diagnosis and lead to the proper therapy. Neurinomas of the gasserian ganglion will also, on occasion, produce similar symptomatology, but the finding of objective sensory changes in the division of the trigeminal nerve should immediately suggest such a diagnosis.

Harris⁷ has pointed out that on rare occasions, sharp shooting pains in the face may occur following thrombosis of the posterior inferior cerebellar artery or of small perforating pontine branches of the basilar artery. Here again, the presence of objective neurologic signs should establish the fact that the disease is not true tic douloureux.

The pain of dental or periodontal disease is rarely confused with trigeminal neuralgia of the second or third division of the trigeminal nerve, while migraine equivalents seldom are limited to the anatomic distribution of the trigeminal nerve. The pain of Costen's syndrome is so clearly related to movements of the jaw as to be unmistakable. Postherpetic trigeminal neuralgia is easily diagnosed on the basis of previous herpetic infection, and, although it is associated with some paroxysmal pain, there is an almost constant "background" of pain. A syndrome identical to tic douloureux occurs in multiple sclerosis, but rarely is it the first symptom of the disease. Therefore, here too the history, age of onset, and the neurologic findings should help in establishing the etiology of the manifestation.

From the preceding, it can be seen that in tic douloureux, the neurologic examination is always normal, and there are never objective signs in the sensory distribution of the trigeminal nerve. Should such signs be present, the diagnosis of true trigeminal neuralgia can no longer be entertained.

One of the few mitigating factors in this disease is that long-term and, occasionally, permanent remissions do occur. This, of course, complicates the evaluation of any medical therapy. Occasionally, if the history suggests that an episode in the disease usually lasts a few days or, perhaps, two or three weeks and then goes into remission for a considerable period, it is better to withhold therapy of any kind, provided the patient understands his illness and agrees with this decision.

The type of therapy to be employed must depend on how severely the patient is incapacitated, not only physically by the pain but also psychologically by his dread of the next paroxysm. The physician may try purely medical

therapy if attacks are infrequent or simply interfere with household duties, whereas, if the patient's employment is in jeopardy, he may find injection or early operation necessary. The patient's attitude toward his illness as well as the extent, type, and success of previous therapeutic procedures are important considerations.

Little short of injecting the offending division can be done for the patient during the actual paroxysm of pain. However, the paroxysm is usually of such short duration as to make this procedure of questionable value. If possible, narcotics should not be used, since, in a disease such as this, with frequent recurrences and in which the fear of the recurrent attack is so prominent, the risks of iatrogenic addiction are serious. The inhalation of trichlorethylene every two or three hours may give transient relief of the acute attack.⁸ In attacks of moderate severity, aspirin and codeine may be of some help.

For longer term therapy, intramuscular injections of cyanocobalamin (vitamin B₁₂) have relieved paroxysmal attacks in 50 to 80 per cent of the patients.⁹ There are various ways of administering this treatment, a common way being the daily injection of 1 cc. of cyanocobalamin containing 1,000 μ g. per cc. for a period of ten or twelve days. Needless to say, it is difficult to evaluate the actual value of the therapy against the possibility of a spontaneous remission. Evidence seems to suggest that these injections may indeed be helpful. Certainly, this simple, harmless method of treatment should be made available to all patients with tic douloureux.

The intravenous injection of stilbamidine isethionate has also been recommended in the treatment of this condition.¹⁰ The potential toxicity of this drug, the long period necessary before evaluation of results is possible, the difficulties inherent in continuous and repeated intravenous therapy, and the large percentage of patients who complain of the burning paresthesia resulting from the characteristic neuropathy of the trigeminal nerve make this type of therapy of doubtful value.

Oral administration of various vitamin preparations, including cyanocobalamin has had no effect. Injection of the trigger zones with local anesthetics has been ineffective in most instances.

A different form of therapy consists of the injection of either local anesthetic agents, such as procaine, or of absolute alcohol into the gasserian ganglion or into whichever sensory branch is affected. Injection of alcohol into the ganglion was first proposed by Hartel¹¹ in 1912. Harris¹²

reviewed his experience and reported extremely satisfactory results with this method in 1,433 cases. However, the occasional resultant devastating paralysis of cranial nerves has deterred most neurosurgeons from using this method. Jaeger¹³ recently proposed injecting boiling water into the gasserian ganglion, claiming that it was effective in relieving tic douloureux in 98 per cent of his patients. It has none of the dangers of alcohol injection and is, as far as he has been able to determine from his follow-up studies, capable of producing complete cure.

A simpler and more popular form of therapy has been the injection of the different sensory branches of the trigeminal nerve at the periphery. The first division is easily accessible at the supra-orbital notch; the second, with some practice and experience, can be injected through the infra-orbital foramen; while the third division may be injected at the mandibular foramen. If relief and an anesthetic zone are obtained with procaine, the needle is left in place and absolute alcohol is then injected into the nerve. This, of course, results in an area of anesthesia corresponding to the area of distribution of the affected sensory branch.

Alcohol injection remains an eminently satisfactory means of managing tic douloureux even though the results are rarely permanent. Peet and Schneider¹⁴ reported that 74 per cent of their patients obtained relief for less than two months, and only 15 per cent were relieved for more than one year. The alcohol injection can be performed as an office procedure and may naturally have to be repeated on several occasions.

Because of the close association and connections with other nerves in the area, it has been suggested that relief may be obtained by injection of other nerves. Thus, Wyburn-Mason¹⁵ obtained relief in 56 patients with tic douloureux by alcohol injection of the greater auricular nerve. Crue and his co-workers¹⁶ reported good results by injecting alcohol into the great occipital nerve.

The value of these different types of injections must once more be viewed in relation to the possibility of spontaneous remission in this disease. In addition, the possibility exists that almost any procedure might be useful as long as the cycle of the paroxysmal attack is interrupted. This is known to take place in the treatment of migraine, which comes in cycles similar to those encountered in tic douloureux. Since some authors have postulated the establishment of "reverberating circuits" or "self-contained cir-

cuits" in the thalamus in cases of severe pain, such as tic douloureux, the interruption of such a circuit by a nonspecific procedure might explain the temporary relief in the same manner as the fact that root section may not necessarily lead to permanent relief of the disease.

Surgical intervention is probably the best established type of therapy for this condition. It is almost predictable that the great majority of patients with tic douloureux eventually require surgery to achieve complete lasting relief.

A variety of surgical approaches to this problem were used¹⁷ until Spiller and Frazier¹⁸ introduced the modern operation, which consisted of sectioning the sensory roots between the ganglion and the pons. Later, this operation was further refined by the introduction of differential root section, so that anesthesia would be restricted only to the affected area. The results of this type of operation are unfortunately not entirely satisfactory. Even though the mortality varies between 0.5 and 1.6 per cent, postoperative complications include keratitis in 5 to 15 per cent, facial paralysis in 2 to 6 per cent, and residual paresthesia develops in approximately half of the patients.⁹ The latter complication frequently becomes the most objectionable, and many patients complain bitterly of the constant and painful "numbness" which has replaced the occasional attacks of pain. In one large series,¹⁴ severe trigeminal pain recurred in 14 per cent of patients upon whom operations were performed.

A more recent procedure, introduced by Taarnhøj¹⁹ in 1952, consists of decompression of the posterior root by simply opening the dural sheath. This operation has the advantage of not producing unpleasant postoperative paresthesia. Relief is obtained in a considerable number of patients. An added advantage is that posterior root section can always be resorted to if the trigeminal neuralgia recurs. This operation

has gained considerably in popularity in this country in recent years.

Trigeminal tractotomy in the brain stem, introduced by Sjöqvist²⁰ in 1938, is a rather formidable procedure. The results are not materially better than those gained in other procedures and do not justify the risks of this operation.

Compression rather than decompression of the gasserian ganglion proposed by Shelden,²¹ simple exposure of the ganglion with production of hyperemia as practiced by Stender,²² electrocoagulation of the gasserian ganglion used by Kirschner,²³ and section of the greater auricular nerve advocated by Wyburn-Mason¹⁵ have all been used to limited extent with various degrees of success and are still in the process of evaluation.

CONCLUSIONS

The proper management of the patient with trigeminal neuralgia depends upon the patient's attitude towards his illness, the degree of severity of the disease in terms of discomfort and disability, and the amount and extent of previous treatment.

It is advisable to suggest a course of medical therapy, that is, cyanocobalamin injections, to the patient whose tic occurs at infrequent intervals and does not materially interfere with his normal activities. Alcohol injections of the offending branch should always precede surgical intervention, but endless repetitions of this procedure rapidly reach the point of diminishing returns. Effective surgical therapy in a patient who has been adequately prepared for possible complications of the operation, suggested at the proper time in the course of the management, will result in complete rehabilitation of the great majority of severely disabled patients.

There is no doubt that in most cases of tic douloureux, patients should be prepared for eventual surgical relief, since medical therapy is, in most instances, of only temporary value.

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Book Reviews on Pain

INTRODUCTION TO ANESTHESIA: THE PRINCIPLES OF SAFE PRACTICE, by ROBERT D. DRIPPS, M.D., professor and chairman, department of anesthesiology, Schools of Medicine, University of Pennsylvania and anesthetist, Hospital of the University of Pennsylvania, Philadelphia; JAMES E. ECKENHOFF, M.D., professor of anesthesiology, Schools of Medicine, University of Pennsylvania and anesthetist, Hospital of the University of Pennsylvania, Philadelphia; and LEROY D. VANDAM, M.D., clinical professor of anesthesia, Harvard Medical School and director of anesthesia, Peter Bent Brigham Hospital, Boston, 1957. Philadelphia and London: W. B. Saunders Co., 266 pages.

All the authors of this work are well known and are persons of authority in the field. What they have to say represents accepted sound opinion. They cover the field of anesthesia rather well, and they have included useful information on the management of narcotic poisoning. They have made use of the most difficult but most commendable literary technic of saying much in few words, a technic which calls for a high degree of accuracy. This requirement they have successfully satisfied.

The book is printed on good paper, is easily read, and is fairly well indexed. It is pleasant to come upon a book as well done as this one. Anyone who is interested in anesthesia should acquire the book.

JOHN S. LUNDY, M.D.

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ANATOMIES OF PAIN, by K. D. KEELE, M.D., F.R.C.P., 1957. Springfield, Illinois: Charles C Thomas, 206 pages. \$5.50.

This book should become a classic and very likely it will. Seldom does the reader experience such genuine pleasure and even excitement from a book as are provided by this one. The work both stimulates thought and enlarges one's understanding of the ancient problem of pain. The book would add greatly to the knowledge, practical and cultural, of anyone interested in the subject of pain.

In his prefatory remarks, the author wisely observes, "There appears to exist a widespread conviction that, owing to the technical advances of the last century, nothing of value can have existed previously that can cast any useful or revealing light on our present problems. The result is that historical introductions rarely

press further into the past than to a vaguely defined 'Victorian era,' and often with imperfect comprehension even this far. A case in point occurs in a comprehensive current work on the subject of pain, which by attributing the discovery of the spino-thalamic tract to Spiller in 1905, ignores some fifty years of significant previous work on this subject. To ignore the time dimension of any problem is to risk misunderstanding it. Particularly is this so if, as with regard to Pain, it involves neglect of the keenest and most brilliant thinkers the world has known.

"It is only of recent years that Pain itself has emerged as a problem in its own right. Yet it has received special attention as part of disease from the earliest dawn of civilization. It is the purpose of this book to show how the changing ideas on the anatomical and physiological basis of Pain have flowed as a continuous process from the most ancient medicine until the present day. To attempt this is not to attempt a complete history of the subject, but only to trace the growth of anatomy and physiological concepts which lie, often unconsciously, at the roots of our present ideas. To achieve such an integration I have necessarily been selective of those writers whose works are for the most part well known, for their influence has been greatest. Though authorities have been omitted whose names rightly carry much honor in the history of medicine, I have included all those I have found who made significant contributions to the process of the evolution of the subject.

"It is my own conviction that 'right thinking' is an impersonal mode of mental activity in the Buddhist sense; and that thinkers like Aristotle or Leonardo da Vinci achieve exquisitely intimate interpretations of observed phenomena, outstripping humbler thinkers, whenever they are born. However, one of the clearest lessons to be learned from such a survey is that it is not enough to have the right ideas; if they are to be fruitful of results, they must be produced at the right time, when there is sufficient contextual background to support them. It was just this failure of the intellectual milieu of his day that gave Leonardo's right ideas such poor fruit, leaving him in so many fields merely the 'anticipator' rather than the recognized 'discoverer.'

"In this book there will be found a story of anticipations needing firmer ground to raise them to discoveries. Some have achieved such status already; others await it.

(Continued on page 34)

Editorial

A COMMON PAIN AND AN UNCOMMON PROBLEM

AMONG the many common pains which may visit the head, tic douloureux is one of the most severe. This pain is so disabling that anything which can be done to alleviate it is eminently worth while. In fact, this type of pain is so stubborn that the subject itself never becomes old. It is treated in this issue by Dr. Charles M. Poser under the title of "The Management of Tic Douloureux."

In the October 1957 issue of the Section of Pain, I pointed out that I had been able, by means of the combined use of several new agents, to develop a plan to assist those who are doing cardiac catheterization in children too young to cooperate. My experience at that time was not very broad. It still is not too extensive, but I did describe in more detail in the November 1957 issue of the *Journal of American Association of Nurse Anesthetists*¹ how this was managed. Much more detailed instructions having to do with this problem will appear soon, I hope, in the *Journal of the American Medical Association*.²

The present editorial was written on December 11, 1957. To that date I had carried out the

procedure for 34 patients, and, in general, the method has been very satisfactory. I am in the process of making it easier to measure the dose of the drugs required. One drug, alphaprodine hydrochloride (Nisentil hydrochloride) was supplied by the manufacturer in the proportion of 60 mg. to the cubic centimeter of solution, a proportion which made it almost impossible to measure a dose that would be minute enough to administer to a small baby. The proportion of this agent to its solution will be corrected in the future, I am sure.

As for the procedure itself, I have also used it for two or three patients who were to undergo examination of the eyes. It permitted examination adequate for arrival at a diagnosis—something which has been difficult heretofore.

I think it is worth repeating that sometimes better results can be obtained with drugs which produce only analgesia and amnesia than with drugs used in a dose large enough to produce anesthesia. Cyanotic patients who have undergone cardiac catheterization have ranged from 15 months to 14 years and from 15 to 90 lb. There may be other uses for this particular method, but thus far we have not tried others. The editor would appreciate comment about other methods of managing these small children during the diagnostic maneuver concerned.

JOHN S. LUNDY, M.D.

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BOOK REVIEWS

(Continued from page 33)

Perhaps one of the most topical of such anticipations is the concept of the sensorium commune, which, far from being an idea of our Victorian ancestors (as stated in a current medical journal), is traceable back to the most ancient thinkers on the nature of sensation, and now appears due for rebirth.

"It is my hope that present-day workers on Pain will find in these Anatomies of Pain a useful background to the problem, and possibly some still fertile seeds from the past worthy of germination.

"To avoid the manifest risk of errors inherent in paraphrasing views of ancient authorities, I have freely quoted from their works. This however does not obviate the erroneous significance which may be attached, for example, to Aristotle's often quoted description of pain as a 'passion of the soul,' which words cannot be intelligible without some background of Aristotelian physi-

ology. I have therefore endeavored to introduce each authority's views on pain with a sketch of his concept of the basis of sensation sufficient to render the quotations comprehensible.

"It has been my endeavor to render these accounts as objective as possible in all chapters, with the exception of the last, in which I have allowed myself to express a more personal interpretation of the present anatomy of pain."

It is fascinating indeed to be taken back over the years on a scientific Pegasus in a sort of guided tour of the various anatomic and physiologic monuments to significant thought in the understanding of pain mechanisms.

The book is printed on good paper and can be easily read. It contains two indices—one on subjects and one on personal names. Each chapter is well documented with a bibliography. In sum, this book is a magnificent contribution to the literature on pain.

JOHN S. LUNDY, M.D.

Current Literature on Pain

ANALGESICS AND THEIR ANTAGONISTS: SOME STERIC AND CHEMICAL CONSIDERATIONS. PART III. THE INFLUENCE OF THE BASIC GROUP ON THE BIOLOGICAL RESPONSE, by A. H. BECKETT, A. F. CASY, and N. J. HARPER: *J. Pharm. & Pharmacol.* 8:874-884, 1956.

"Elsewhere the thesis was advanced that the basic group of the molecule influenced analgesic activity and evidence was adduced in support. In morphine-type compounds, a gradual transition from analgesic to anti-analgesic activity occurred as the group was changed from N-methyl to N-ethyl, N-n-propyl and N-allyl It seems reasonable to assume that the mechanism of action of an analgesic antagonist involves competition with an analgesic for the 'analgesic receptor site,' but 'fit' at the receptor surface does not of necessity mediate an analgesic response

"The hypothesis is advanced that analgesics and their antagonists undergo a similar chemical reaction subsequent to adsorption, the rate constant for the former being very much greater than that for the latter. Oxidative dealkylation to produce nor-compounds is presumed to be the first step in the reaction sequence leading to analgesia. Nor-morphine has been shown to have a greater analgesic activity than morphine upon intracisternal injection into mice."

From JOHN S. LUNDY and FLORENCE A. MCQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 19. Copyright by JOHN S. LUNDY.

FATALITIES FOLLOWING TOPICAL APPLICATION OF LOCAL ANESTHETICS TO MUCOUS MEMBRANES, by J. ADRIANI and D. CAMPBELL: *J.A.M.A.* 162:1527-1530, 1956.

"It is surprising that many physicians are unaware of the hazards of local anesthesia. The pioneers in this field recognized and emphasized the pitfalls that result from the misuse of local anesthetic drugs Accurate statistics on the frequency of untoward reactions and fatalities due to local anesthetics are not available, because few such mishaps are reported. We are familiar with 10 unreported fatalities in a 15-year period in this institution [Charity Hospital, New Orleans] caused by the topical application of tetracaine to mucous surfaces for endoscopic procedures

"It is the intent of this report to emphasize the extreme potency and relative frequency of toxic effects from tetracaine and not to incriminate the drug as a lethal substance that should be discarded The major distinction between reactions due to tetracaine and those of the other aforementioned drugs has been the absence of convulsions and the abrupt onset of syncope. The interval between the onset of symptoms and the moment of the fatal termination was brief The incidence of reactions with use of tetracaine by other routes has been considerably less than with the topical route

"Rapid absorption has been presumed as the cause, but data in support of this contention have not been available. Studies of blood levels of tetracaine indicate that this occurs and at a more rapid rate than has been supposed. A quantity of drug that results in no detectable blood level when infiltrated subcutaneously gives levels when applied topically that are equal to one-third to one-half of those after intravenous injection. The un-

toward responses are due to the rapid passage of the drug from the site of application into the systemic circulation. The absorption from mucous membranes is far more rapid than clinicians have realized and simulates intravenous administration. Study of the fatalities that have occurred indicates that the cause of death is overdosage from rapid absorption."

From JOHN S. LUNDY and FLORENCE A. MCQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 4. Copyright by JOHN S. LUNDY.

CORTISONE AND ANESTHESIA, by S. W. GORENS: *J. Am. A. Nurse Anesthetists* 24:259-264, 1956.

"Evidence exists to indicate that with more prolonged administration of cortisone, suppression of adrenal cortical function may persist for as long as 3 to 6 months after the use of the hormone is discontinued The patient may show evidences of adrenal insufficiency at induction of anesthesia during the course of surgery or in the immediate postoperative period. The first and possibly only evidence of acute adrenal insufficiency is otherwise unexplainable cardiovascular collapse with shock, tachycardia, pallor, etc. . . .

"The pituitary-adrenal interrelationship is altered by the exogenous administration of cortisone so that as a result you may get adrenal atrophy and insufficiency. That with the stress of anesthesia and surgery, adrenal response may be inadequate and you may get collapse, shock and death. In view of the ever increasing number of individuals who are and will be receiving cortisone and may have potential adrenal insufficiency, it is important that anesthesiologists and surgeons be aware of the dangers and be prepared to handle any emergency situation that may arise in this regard."

From LUNDY, JOHN S., and MCQUILLEN, FLORENCE A: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 73. Copyright by JOHN S. LUNDY.

THE ASSESSMENT OF THE CARDIAC PATIENT FOR ANAESTHESIA, by A. J. W. BEARD and J. F. GOODWIN: *Brit. J. Anaesth.* 28:557-568, 1956.

"Patients with cardiac disorders present the anaesthetist with three main problems which are related to (1) the operation itself, (2) the ability of the patient to withstand operation or any of its complications, and (3) the selection of the anaesthetic agent and technique A close rapport between anaesthetist and surgeon, and their joint understanding of the physiopathology of heart disease makes for greater safety

"The cardiovascular state may be such that even an urgent condition such as an operable neoplasm must remain untreated, but this is unusual, as, given time for treatment of such conditions as congestive heart failure or for the healing of a recent cardiac infarction, surgery can often be carried through with little increased risk. The control of cardiac rhythm and rate, the correction of sodium and water retention, the treatment of anaemia, the prevention of pulmonary infections, and weight reduction in obesity can so change the picture as to allow the completion of even radical surgery

"Hypoxia is the greatest danger to which the cardiac patient is exposed during surgical operation. It is often associated with other pathological conditions, such as heart failure or hypotension, either as cause or effect.

Hypoxia must therefore be considered in relation to such states rather than as an isolated condition

"Ordinarily hypoxia is associated with carbon dioxide retention which in moderate excess causes tachycardia; gross carbon dioxide excess, however, impairs the conduction in the bundle of His, producing heart block and slow ventricular rate. Furthermore, carbon dioxide retention increases cardiac irritability and, especially in the presence of cyclopropane or chloroform, cardiac irregularity may be so gross as to impair the circulation

"Hypoxia may also result from anaemia. The danger of circulatory overloading is well recognized, especially in heart conditions associated with left ventricular failure, mitral stenosis, or pulmonary heart failure. Any transfusion to remedy the anaemia must be given slowly, and the use of packed red blood cells is advisable. The use of iron, perhaps given intramuscularly, may sometimes make transfusion unnecessary

"In order to reduce the oxygen consumption of the tissues, hypothermia may be used, but it carries a greater liability to ventricular fibrillation with increasing age and in the presence of heart disease On the other hand, the avoidance of hyperthermia, or even permitting a few degrees of cooling, is of considerable benefit

"The blood pressure is maintained by the cardiac output and the total peripheral resistance. The total peripheral resistance depends on the state of constriction or dilatation of the arterioles. If these are dilated the blood pressure will fall There is not yet agreement as to the circulatory effects of the generally accepted anaesthetic sequences While there are difficulties in assessing the haemodynamics of anaesthetic agents in experimental animals and in healthy men, there is, for obvious reasons, very little precise information from patients with cardiac disease

"The risk of anaesthesia often depends as much upon the experience and skill of the anaesthetist and the pre-operative degree of cardiac efficiency as upon the type of heart disease In general, the risks to which the patient with cardiac disease is exposed depend on the nature of the proposed operation and its possible complications and on the general cardiovascular status of the patient. The type of anaesthetic, provided it is competently administered and conforms to basic principles, together with the specific nature of the cardiac disability is usually of lesser importance. Nothing overrides the truth that techniques and disease processes which impair the oxygen supply to the heart are always a threat to life."

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PEDIATRIC ANESTHESIA, by L. D. BRIDENBAUGH, Jr.: *J. Am. A. Nurse Anesthetists* 24:155-163, 1956.

"Anesthetists who have had limited experience in administering anesthesia to children are still proceeding on the theory that children are 'just small adults,' and that if an anesthetic agent is appropriate for an adult, it is also appropriate for a child. However, certain anatomical and physiological characteristics peculiar to the child must be recognized and, accordingly, the amount of anesthetic agent and the technique of administering it must be suitably altered

"Variations between the respiratory system of the child and that of the adult are of the utmost importance to the anesthetist. These include—Resilience of the bony part

of the thoracic cage, Incomplete development of the lung tissue, Increased respiratory rate and Small tidal volume

"Peculiarities of the child's cardiovascular system, important to the anesthetist, include—Inherent automaticity, Increased heart rate, (and) Low blood pressure, Blood loss during surgery is tolerated poorly by infants because they have a small blood volume (roughly 80 cc. per Kg.) and are naturally hypotensive.

"The central nervous system of the infant also presents variations from that of the adult. Most of them are due to the immaturity of the nervous tissue and result in—Decreased sensation, and Increased incidence of convulsions, The heat regulating centers of the infant are immature

"The anesthetist should check to see that the patient to be anesthetized has an empty stomach. Aspiration of vomitus is as serious a complication in the child as it is in the adult During the course of anesthesia an infant frequently develops an acute distention of the stomach. The cause for this is unknown The child's kidney is much less capable of dealing adequately with excess amounts of saline than is the adult's kidney.

"A plea is made for those administering children's anesthesia to use the drugs and techniques with which they are most familiar and to use them cautiously. If this is done, pediatric anesthesia will truly be 'anesthesia without tears'—on the part of both child and parents."

From JOHN S. LUNDY and FLORENCE A. MCQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, pages 28-29. Copyright by JOHN S. LUNDY.

CONTRIBUTION TO THE THERAPY OF MYOCARDIAL DEPRESSION CAUSED BY THIOPENTONE SODIUM (STUDIED BY HIGH FREQUENCY CARDIOMYOGRAPHY), by A. FRONEK and Z. PISA: *J. Anaesth.* 28:366-372, 1956.

"A fall in blood pressure occasionally occurs during intravenous anaesthesia with various barbiturate preparations In the studies to be reported, there have been analysed more closely the factors causing lowering of the blood pressure during intravenous anaesthesia with sodium thiopentone and we have attempted to influence this decrease in pressure therapeutically. The effect of this therapeutic intervention on the depth and duration of anaesthesia has also been investigated Experiments were carried out in a total of 15 dogs

"A weakening of ventricular contraction during intravenous administration of thiopentone has been demonstrated with high frequency cardiomyography. A direct depressant action on myocardial muscle by this drug has also been demonstrated following its intracoronary administration. It has been found that falls in blood pressure caused by thiopentone are immediately reversible by the intravenous administration of 5 to 10 ml. of 10 per cent CaCl₂.

"The intravenous administration of CaCl₂ affects neither the duration nor the depth of anaesthesia in rabbits. It has been emphasized that these findings may be of some importance by increasing the safety of intravenous barbiturate anaesthesia: (1) in patients with latent or manifest ischaemic myocardial diseases; (2) in patients in shock; (3) in cases of accidental overdosage or when more toxic preparations are used."

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The Diagnosis and Treatment of Endocrine Disorders in Childhood and Adolescence, by LAWSON WILKINS, M.D., ed. 2, 1957. Springfield, Illinois: Charles C Thomas. \$17.50.

This is a thorough revision of the first edition of Dr. Wilkins' excellent textbook. In addition, the text and illustrations have been expanded considerably. The author has done an excellent job in bringing this book up-to-date at a time when progress in this field has been very rapid. Although not intended to be a thorough treatise of every endocrine disorder in children, it is without doubt the best available source from which to start complete coverage of any facet of endocrinology in childhood. The notable exception is that diabetes in children is not included. Now included is the latest information on the steroid physiology and clinical aspects of diagnosis and treatment of the adrenogenital syndrome. The author and his co-workers have been leaders in this field, and their very valuable experience is documented in a clear-cut, easily read section. In addition, a new section is devoted to the newer knowledge regarding the "goiterous cretins." An entire new chapter has been included to

BOOK REVIEWS

familiarize the practitioner with new diagnostic laboratory hormone determinations. The purpose of this chapter appears to be to familiarize the clinician with the intelligent use of these tests rather than to serve as a laboratory manual. Such a purpose is quite well fulfilled.

Each chapter of this book is written in essentially the same form as the first edition, although most chapters have not only been revised and brought up-to-date but also enlarged. Very little material is included that is not essential to the understanding of the conditions discussed. The style creates a logical sequence of written presentation and is accompanied by fine illustrations. The number of illustrations also have been increased and are reproduced in excellent quality. The use of schematic diagrams as well as

pertinent summaries of the illustrated pictures gives one the impression of having worked with the patient himself.

This book cannot be recommended too highly to any physician who deals with children, including those in the sub-specialties. It is also recommended to owners of the first edition, because so much new material essential to understanding the rapid advances which have been made has been added since this book was first published.

ROBERT ULSTROM, M.D.

•
Regulation and Mode of Action of Thyroid Hormones, Ciba Foundation Colloquia on Endocrinology, Vol. 10, edited by G. E. W. WOLSTENHOLME and ELAINE C. P. MILLAR, 1957. Boston: Little, Brown and Co., 303 pages. \$8.50.

This volume should be brought to the attention of all those especially interested in the mode of action of thyroid hormones, which was made possible through conferences sponsored by the Ciba Foundation and supported by Ciba Ltd., of Switzerland. Scientists from various countries participated in this colloquia presenting chiefly physiologic aspects as shown in well-illustrated scientific articles. Each contains

(Continued on page 26A)



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BOOK REVIEWS

(Continued from page 24A)

pertinent bibliography followed by free discussion from the participants. The clinical reader should appropriate stimulating items of interest from such perusal. The Ciba Foundation, its editors, and the supporting industry are to be praised for their sponsorship.

C. A. MCKINLAY, M.D.

The Surgical Management of Pulmonary Tuberculosis, edited by JOHN D. STEELE, 1957. Springfield, Illinois: Charles C Thomas, 213 pages. \$9.50.

This monograph is the first of a series concerned with various phases of thoracic surgery and dedicated to Dr. John Alexander. It is fitting that this initial volume should be concerned with a subject to which Dr. Alexander contributed so greatly, and most of the participants are his former residents. It is a reasonably short but complete presentation of current concepts regarding the surgical treatment of pulmonary tuberculosis. The initial chapters trace the development of surgical procedures for the treatment of pulmonary tuberculosis. Ensuing chap-

ters outline the indications for various types of resections and give morbidity and mortality figures. Combined collapse and resection therapy is discussed, as is plombage and the treatment of pleural tuberculosis. An interesting chapter on thoracoplasty indicates the general trend away from such a procedure as an isolated form of surgical therapy, although its use as an adjunct either before or after resection is common. Good results with decortication and cavernostomy in certain cases are pointed out, and such procedures appear to have considerable usefulness in the treatment of persistent pleural spaces and cavities. There is an interesting chapter on the surgical management of tuberculous psychotic patients. A final chapter is devoted to the chemotherapy of tuberculosis and includes historic, bacteriologic, and clinical material. The volume is well-written, extremely readable, and the references following each chapter are remarkably up-to-date, considering the number of contributors. It should find wide favor with all those interested in this important subject.

RICHARD H. EGDAHL, M.D.

Urology and Industry, by LEONARD PAUL WERSHUB, 1956. Springfield, Illinois: Charles C Thomas, 151 pages, 3 parts. \$5.00.

The purpose of this book, as stated by the author in the preface, "to serve as a practical guide to the industrial physician and the urologist in the medico-legal problems arising from industrial accidents and illnesses," is achieved satisfactorily.

The evolution of industrial medicine and Workmen's Compensation Acts is discussed briefly. The second part of this book is concerned with the legal and medical evaluation of liability. In the third part, 100 industrial urologic cases and their legal connotations are adequately presented. Three typographical errors are noted: on page 56, vesicle should be vesical; on page 86, prostatitis should be prostatic; and on page 94, diverticuli should be diverticula.

The text is well written and concerned with a subject with which most physicians are unfamiliar. The inadequacies in the teaching of forensic medicine in most medical schools are emphasized. It is a valuable addition to the library of the industrial physician and urologist. The bibliography is adequate.

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The Treatment of Diabetic Acidosis

EDMUND B. FLINK, M.D., AND THOMAS K. OLWIN, M.D.

Minneapolis, Minnesota

A BRIEF REVIEW of the pathogenesis of diabetic ketosis will be made in order to outline a rational basis for therapy. The reader is referred to the most recent Medical Progress review of diabetes mellitus by Beaser.¹

Diagnosis requires a clear definition of diabetic acidosis and coma and adherence to strict criteria. A state of coma, that is, a profound state of unconsciousness, may occur in a diabetic patient, as in any other person, without being related to diabetic acidosis. The other most important cause of a comatose state in diabetic patients is hypoglycemia. Many tragedies have resulted from confusing hypoglycemia with diabetic acidosis, since the former is one of the most serious medical emergencies and must be treated immediately. Other causes include head trauma, cerebrovascular occlusions, meningitis, encephalitis, and brain tumor. Any of these conditions could also be the precipitating factor in acidosis.

Because of these considerations, a diagnosis of diabetic acidosis should not be made and intensive treatment should not be given unless the following criteria are present: ketonemia and hyperglycemia (and, usually, ketonuria and glycosuria), decrease of carbon dioxide content or capacity to less than 15 mEq./l., and clinical evidence of acidosis and dehydration. Milder ketosis than this needs prompt treatment with

insulin and other measures but doesn't require the heroic treatment which will be discussed in detail. Obviously, prevention of severe acidosis by the early treatment of ketosis is better than the best later management of severe acidosis.

PATHOLOGIC PHYSIOLOGY OF DIABETES ACIDOSIS

Lack of insulin is of prime importance and results in impaired glycogenesis, increased glycogenolysis, and failure of the glycolytic cycle. This causes insufficient pyruvic acid production and disturbance of metabolic equilibrium with ketonemia and ketonuria (acetone, aceto-acetic acid, beta-hydroxybutyric acid). The ketonemia and ketonuria, the hyperglycemia and glucosuria, in turn, result in polyuria, cellular and extracellular dehydration, loss of electrolytes, and acidosis. These processes develop as a chain reaction and can be reversed only by adequate insulin and replacement of fluids and electrolytes which have been lost. The lack of insulin may be due simply to failure to administer it, an increased demand due to infection, stress, and so forth, or to previously unrecognized diabetes. It is important to ascertain immediately the precipitating factor in each instance.

Three studies have defined clearly the very large fluid and electrolyte deficits which occur in diabetic acidosis.³⁻⁵ Two of these studies record the cumulative negative balances during production of acidosis by insulin withdrawal, and the third records balance studies of a group of 5 patients during recovery from acidosis. Table 1 summarizes the findings of these studies.

EDMUND B. FLINK is chief of the Medical Service at Veterans Administration Hospital, Minneapolis. THOMAS K. OLWIN is with the Department of Medicine at Veterans Administration Hospital.

TABLE 1

	<i>Atchley</i>	<i>Butler</i>	<i>Nabarro</i>
Body size	58 kg.	68 kg.	1.73 sq.m.
Water, liters	3.8	6.6	5.5
Sodium and magnesium, mEq.	216.		
Sodium, mEq.		322.	428.
Magnesium, mEq.		50.	40.
Potassium, mEq.	362.	388.	339.
Chloride, mEq.	42.	272.	390.
Phosphorus, gm.	4.6	5.	1.13

Severe enough acidosis developed on the fourth day in the patient of Atchley and associates³ so that the experiment was stopped at a time when the CO₂ was 14.6 mEq./l. The data recorded in table 1 were actually observed. The observations of Butler and associates⁴ are partially derived data in that theoretic losses from severe acidosis are added to those actually observed and are included, since the acidosis was not permitted to progress to a serious point. The data of Nabarro and associates⁵ are the actual cumulative balances from 5 patients being treated for diabetic acidosis. These latter data, therefore, are the most representative, but the close similarity of all 3 studies is very impressive. It is noteworthy that the extracellular losses represent from 20 to 25 per cent of the total extracellular volume and that the potassium loss represents 8 to 9 per cent of body stores.

If one uses 70 kg. as the weight of a 1.73 square meter person (Nabarro study), the average losses in Butler's and in Nabarro's studies can be expressed as follows on a per kg. basis.

	<i>Butler</i>	<i>Nabarro</i>
Water, ml./kg.	100.	80.
Sodium, mEq./kg.	5.	6.
Chloride, mEq./kg.	4.	5.5
Potassium, mEq./kg.	6.	5.
Magnesium, mEq./kg.	0.8	0.6
Phosphorus, mg./kg.	70.	15.

It is evident from Nabarro's detailed data that there is quite a bit of variability in certain items, particularly in nitrogen and phosphorus. It is also clear that mild acidosis of short duration

is associated with much smaller cellular ion losses but often nearly maximum extracellular fluid losses. The importance of these studies cannot be overestimated, for they permit us to make a reasonable calculation of the requirements of a patient with diabetic acidosis. The studies emphasize the fact that large quantities of both intracellular and extracellular ions are lost.

The recognition of fatal respiratory paralysis due to hypopotassemia during the course of treatment of diabetic acidosis⁶ marked a milestone in the understanding of potassium metabolism. Many cases have been reported since then of serious hypopotassemia. In spite of their concerted effort to prevent hypopotassemia, Smith and Martin⁷ found that the largest single cause of death in their series was hypopotassemia, since inadequate amounts of potassium were administered in some cases. "Some" potassium is not sufficient, but at least 1/3 and preferably 1/2 of the theoretic deficit is necessary in the first twelve to sixteen hours.

A brief case report bears out the need for vigorous therapy. This patient, age 23, had classical symptoms of diabetes mellitus for three weeks and then acidosis developed. His treatment for the first forty-eight hours at another hospital and for the next forty-eight hours at this hospital is outlined in table 2.

He was admitted to the Minneapolis Veterans Hospital because of progressive weakness to the point of severe generalized paresis. Some clouding of sensorium and typical electrocardiographic changes of hypopotassemia were noted on admission. Unnecessarily large amounts of sodium salts were administered during the second forty-eight-hour period. The ready-made solution used in this instance had an inadequate concentration of potassium for the treatment of a known potassium deficit. Such solutions are adequate only for daily maintenance unless an ampule of potassium salt is added.

Nabarro and co-workers⁵ emphasize the fact that bowel function and a feeling of well-being were brought to normal more rapidly when adequate potassium was supplied early in treatment. The transfer of sodium into cells when potassium

TABLE 2

<i>J.T.W., 23</i>	<i>Insulin</i>	<i>Water</i>	<i>Na.</i>	<i>Cl.</i>	<i>Lactate</i>	<i>K.</i>	<i>Mg.</i>	<i>HPO₄</i>
Rx. first 48 hours	1,200	7,000	481	460	75	75	18	37
Paralysis								
Serum K. 1.9								
Rx. second 48 hours		6,000	579	745	50	230	12	25
Strength good								
Serum K. 3.2								

was not used can be prevented to a large extent by use of potassium. They emphasize the fact that potassium (and probably also magnesium and phosphate) are indicated for general metabolic functions of cells and not simply for prevention of an occasional instance of cardiac arrhythmia or respiratory paralysis.

TIHERAPY

General measures. Diabetic acidosis must be regarded as a major medical emergency. A physician should be in attendance all the time. Local infections of the skin, ears, respiratory or urinary tract, and systemic infections should be looked for and treated adequately with antibiotics. A detailed history of the diabetes from an informant, if necessary, should include information about insulin dosage and sensitivity, other episodes of coma, precipitating episodes, and so forth.

A chart of the important clinical and chemical data is imperative. This chart should include: pulse, blood pressure, state of consciousness, urine volume, urine sugar, urine acetone and diacetic acid, blood glucose, carbon dioxide capacity, sodium, potassium, plasma acetone, blood urea nitrogen; therapy: insulin, fluid volume, sodium, potassium, chloride, lactate (or bicarbonate), phosphate, magnesium, glucose; and space for comment on associated illnesses. It is important to keep this chart current.

Each chart must be individualized, but a few generalizations can be made. Some data, such as vital signs, should be checked every half hour and oftener if shock exists, of course. Urinalysis should be recorded hourly. Plasma acetone and blood glucose can profitably be checked every two hours until recovery is well under way. The carbon dioxide combining power could be checked at six hours, but, if the course is favorable clinically, it need not be determined again. In order to detect hypopotassemia, serum should be obtained six to twelve hours after starting insulin for optimum results.

When the initial serum potassium is normal in a patient with severe acidosis and, especially, when the blood urea nitrogen is elevated, the

need for potassium is greater, and therapy must be started earlier and given more vigorously. Serial electrocardiograms from the start of therapy are particularly valuable as an aid to potassium administration, since the information is immediately available. A single lead, such as V₃, is all that is needed for these comparative purposes and should be obtained every hour or two.

A severity index⁸ may be calculated from the data charted to roughly determine the prognosis, but it is more important to alert the physician to the need for vigorous therapy because of unfavorable signs. Such an index, furthermore, has the real advantage of calling attention to the most important unfavorable variables, some of which are often ignored in routine management. Zieve and Hill⁸ concluded their study as follows: "considered individually, the order of effectiveness of the significant prognostic variables was age, blood pressure (i.e. hypotension), associated conditions, blood urea nitrogen, degree of unconsciousness, and duration of coma." The need for individualizing treatment according to severity of illness is strongly suggested by the statistical study of Zieve and Hill.⁹ They found no significant differences in treatment in spite of great differences in severity of illness. As shall be apparent later, there appears to be a particular need for individualizing the dose of insulin. The score can easily be calculated from table 3.⁸

Zero is the dividing line between those who have a poor prognosis (negative score) and those who have a better prognosis (positive score). The quantitative value of term I is obtained directly from table 4.

Insulin. The insulin dose used is the subject of considerable controversy. Smith and Martin⁷ found that there was no significant difference in response of patients given 80 units, 160 units, or 240 units initially and every two hours thereafter until hyperglycemia decreased significantly. To the contrary, however, others believe that an increase in insulin dosage has been responsible for great improvement in morbidity and mortality.¹⁰⁻¹² The following doses were used in a large group of patients who were treated at the Joslin Clinic (table 5).

TABLE 3
SUMMARY OF INFORMATION NEEDED TO CALCULATE SEVERITY SCORE

Severity score = I + II - III	
I = (14 AC + 7 DU)	AC = associated condition
II = (0.3 BP + 0.1 BS)	DU = degree of unconsciousness
III = (DC + BUN + 44)	BP = mean blood pressure (S + D)/2
	BS = blood sugar, mg./100 cc.
	DC = duration of coma/hr.
	BUN = blood urea nitrogen, mg./100 cc.

TABLE 4

		RATING OF AC					
		0	1	2	3	4	5
RATING OF DU	0	27.9	14.5	7.6	2.0	-4.6	-15.6
	1	21.4	8.1	1.1	-4.4	-11.0	-22.0
	2	15.6	2.2	-4.7	-10.2	-16.9	-27.9
	3	10.2	-3.2	-10.1	-15.6	-22.3	-33.3
	4	4.2	-9.2	-16.1	-21.6	-28.3	-39.3
Rating scheme of AC		Rating scheme of DU					
0 None		0 Conscious and alert					
1 Very mild		1 Drowsy					
2 Mild		2 Semiconscious					
3 Moderately severe		3 Unconscious but responds to pain					
4 Severe		4 Unconscious and unresponsive					
5 Very severe							

TABLE 5

BLOOD SUGAR LEVEL CORRELATED WITH INSULIN DOSE IN 153 COMA CASES

Blood sugar on admission mg. per 100 cc.	Cases	Average insulin in first 3 hours, units	Average insulin in first 24 hours, units
1,300-1,600	2	800	1,775
1,000-1,300	12	490	826
600-1,000	51	317	482
400-600	46	224	370
200-400	40	110	155
100-200*	2	56	123

*Low values due to administration of insulin on way to hospital

Duncan¹² recommends the following initial doses of insulin according to the severity of the acidosis as measured by plasma acetone reaction:

Initial insulin dose	Plasma acetone test
100 units	4+ undiluted
200 units	4+ 1-2 diluted
300 units	4+ 1-4 diluted
400 units	4+ 1-8 diluted

Following the initial doses, as much as 100 units is given every half hour until plasma acetone is less than 4+ in undiluted plasma.

In a review of 25 instances of diabetic acidosis studied at this hospital, the average doses used were:

	Initial blood sugar	Average insulin dosage	
		6 hours	Total 24 hours
1	1,136	475	725
1	660	100	160
12	400-600	255	374
10	296-400	195	248
1	396	780	1,030
Total	25	296-1,136	262
			355

The group of patients treated is too small to draw many conclusions from the study. Reviewing the charts individually indicated inadequate early insulin dosage in some. One patient singled out for attention had a blood sugar of 396. He received invert sugar in large amounts almost from the start of therapy with the result that hyperglycemia was prolonged, and he received what would otherwise have been an unnecessarily large dose of insulin.

The initial dose of insulin should be large and can be given intravenously or half intravenously and half subcutaneously. Unless there is a history of marked insulin sensitivity, the initial dose should be 100 units. If the blood glucose is over 700-mg. per cent, the initial dose should be 200 units, and if the blood glucose is over 1,000 mg./per cent, it should be 300 units. Depending on the severity of the acidosis, a dose of 50 to 100 units should be repeated every half hour for two hours. *The most important consideration is the close observation of the glucose response to insulin in the first four hours. Failure to respond in this time calls for increase in insulin dose.*

Fluid and electrolytes. The following fluid replacement therapy for an average sized adult is

TABLE 6

<i>Fluid</i>	<i>Electrolytes to be added</i>
1. 1,000 cc. distilled water	Two 44 mEq. (3.75 gm.) ampules NaHCO_3 and one 50 mEq. (2.92 gm.) vial NaCl .
2. 1,000 cc. distilled water	One ampule NaHCO_3 and two vials NaCl .
3. 1,000 cc. 5% glucose	One ampule NaCl and one 40 mEq. (2.98 gm.) ampule KCl .
4. 1,000 cc. 5% glucose	One ampule NaCl , 40 mEq. ampule K_2HPO_4 , and 2 gm. MgSO_4 (17 mEq. Mg^{++}).
5. 1,000 cc. 5% glucose	One ampule K_2HPO_4 , one 20 mEq. ampule KCl , and 2 gm. MgSO_4 .

TABLE 7

<i>Water</i>	<i>Na.</i>	<i>Cl.</i>	<i>HCO₃</i>	<i>K.</i>	<i>HPO₄</i>	<i>Mg.</i>	<i>Glucose</i>
1. 1,000 cc.	139	50	89				
2. 1,000 cc.	144	100	44				
3. 1,000 cc.	50	90		40			50 gm.
4. 1,000 cc.	50	50		40	40	17	50 gm.
5. 1,000 cc.		20		60	40	17	50 gm.
Total mEq.	383	310	133	140	80	34	

based on knowledge of average losses. Of course, this therapy has to be individualized. Concentrated ion solutions can be added to a liter of water to make up the solutions as shown in table 6. These solutions will provide the elements shown in table 7.

Appropriate adjustments of these amounts can easily be made for smaller adults and for children. Children require relatively more water, and this can be accomplished by giving somewhat more dilute solutions. Usually, the patient is able to begin oral feeding, including potassium, after this amount of fluid has been given, but some patients require continued parenteral fluid. Potassium chloride (40 mEq.) should be added to the sixth liter, and potassium phosphate (40 mEq.) should be added to the seventh liter of 5 per cent glucose solution. If symptoms or signs of hypopotassemia (weakness, respiratory paralysis, and electrocardiographic changes) supervene in spite of the aforementioned potassium therapy, the concentration can be increased to 80 mEq./l.

It is possible to use commercially available

solutions to accomplish approximately the same results (table 8). One can substitute half-strength lactated Ringer's solution to which is added 40 mEq. of potassium phosphate to 1 liter and 40 mEq. of potassium chloride to the other. Butler's solution can also be used. Still other solutions with this approximate composition can be substituted.

On admission, shock or borderline shock may be corrected by the rapid infusion of the first 2 liters of fluid, since simple hypovolemia may be the cause. However, not all patients with shock will respond, and, particularly, those with profound shock will require a plasma expander, such as 6 per cent dextran solution or whole blood or plasma. In some instances, noradrenalin (or other vasopressor substances) may be needed to maintain blood pressure if plasma expanders in reasonable amount fail to do so.

Potassium should be started about four hours after starting insulin. In general, potassium should not be administered unless urine flow is adequate. However, if respiratory symptoms or grave electrocardiographic abnormalities occur,

TABLE 8

	<i>Volume</i>	<i>Na.</i>	<i>Cl.</i>	<i>Lactate</i>	<i>K.</i>	<i>HPO₄</i>	<i>Mg.</i>
Ringer's lactate	1,000	130	107	28	4		
Ringer's lactate	1,000	130	107	28	4		
*Electrolyte No. 2	1,000	57	70	25	45	12.5	6
*Electrolyte No. 2	1,000	57	50	25	45	32.5	6
Glucose 5% with KCl .	1,000		20		60	40.	
	5,000	374	354	106	158	85.	12

*Plus 20 mEq. potassium chloride to 1 liter and 20 mEq. potassium phosphate to the other.

a small amount of potassium (40 mEq.) should be given. Extremely careful observation is necessary under these circumstances. Some initial potassium deficit would be an advantage during the treatment of prolonged anuria, but hypopotassemia could also aggravate the renal damage or cause death from arrhythmia or paralysis.

In the presence of congestive heart failure or after acute myocardial infarction, the fluid program has to be greatly modified. When edema exists in heart failure, the extra fluid stores will be called on, and the primary and, often, only therapy is adequate insulin administration. Since the electrocardiogram becomes useless to detect hypopotassemia in many cardiac patients, potassium determinations are needed to decide whether to administer potassium.

A review of the course of treatment of 25 patients with diabetic acidosis treated at this hospital from 1952 to 1955 was made to determine how the general principles mentioned before were actually put into practice. Some records showed many defects, whereas others approached ideal management. There were no deaths, but only 3 patients were actually comatose and the severity in general was not as great as in many reported series.

The following records the average fluid and electrolyte therapy of 25 instances of diabetic acidosis (in 17 patients) during the first twenty-four hours.

Water, cc.	5,700
Sodium, mEq.	525
Potassium, mEq. (20°)	105
Chloride, mEq.	454
Bicarbonate, mEq. (18°)	150
Phosphate, mEq. (7°)	77

°Number of instances where the ion was administered.

Since the figures shown are average, some patients received inadequate amounts and some excessive amounts. The extremes were 155 mEq. of NaCl. in 1 patient to 1,065 mEq. of sodium, 783 mEq. of chloride, and 332 mEq. of bicarbonate in another. Potassium therapy was inadequate in many instances. These figures do not take into account electrolytes and fluid lost in the urine. Rapid control of hyperglycemia and ketonemia minimize such losses.

SUMMARY

An attempt has been made to present a form of therapy for diabetic acidosis which is based on knowledge of deficits which occur during the development phase of acidosis. Major emphasis has been placed on a correct diagnosis, large doses of insulin given early, treatment of allied and precipitating conditions, early and repeated determinations of desired progress of glucose and ketone levels, and a reasonable approach to replacement of deficits of fluid and electrolytes known to exist in diabetic acidosis.

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Trauma and Thrombophlebitis

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THROMBOPHLEBITIS in the lower extremities is sometimes a late complication of severe injury elsewhere than in the legs. It may develop days or weeks after such an injury. After a fracture of the spine or the femur, patients are usually at rest in bed and, in addition, have suffered trauma to their soft tissues. The mechanism of thrombosis in such patients is thus very similar to that of thrombophlebitis occurring after surgical procedures, and the later effects of the thrombophlebitis are usually recognized and treated because the acute phase has been recognized.

There is another group of cases of great importance, namely, direct injuries to the leg, which may or may not result in fracture. Because the swelling may be thought to be due to simple trauma or because the limb is hidden in a cast, the resultant thrombophlebitis is frequently not recognized. The high incidence of this condition is evidently not appreciated and, therefore, it is frequently not treated early or with the vigorous postphlebotic management that such a case should have. Reviewing the literature for the last ten years fails to reveal one article on thrombophlebitis directly related to trauma. The absence of literature on the subject indicates either a lack of awareness or indifference to this condition. Because of the considerable disability that results when the postphlebotic changes have progressed to a stage where the patient is unable to work, despite his recovery from the original injury, careful evaluation and recognition of this condition is important. Dr. D. J. Fraser has kindly provided me with some data on such patients taken from the Workmen's Compensation Board's files here. They are not statistical samplings but illustrate how important the disability in certain cases may be. A few illustrative examples follow.

A 28-year-old male had a fractured calcaneus and ischium in 1952. He did not work for approximately a year. In May 1956, four years later, he was receiving a 5 per cent disability for thrombophlebitis. There was a 4-cm. difference in the circumference of the leg.

A 39-year-old male fractured his tibia and femur in

1943. This patient suffered mostly from postphlebotic edema, and permanent disability was 30 per cent. He would have received 40 per cent if he had had an amputation.

A 50-year-old male, who suffered bruises and swelling of both legs and thighs in December 1946, was discharged from the hospital in February 1947 and returned to work in April 1947. However, he had a continuing disability, and, in 1949, a bilateral sympathectomy was performed. In April 1956, he was receiving a 10 per cent disability pension for the effects of old thrombophlebitis.

A 48-year-old male, who suffered a fractured metatarsal in July 1953 and had pronounced swelling after removal of the cast, was admitted to the hospital for anticoagulants. In 1956, his pension was reduced from 25 to 15 per cent.

A 54-year-old male, who fractured his left tibia and fibula in 1953, is now receiving a permanent disability of 25 per cent for bilateral phlebitis, 5 per cent of which is related to a limited flexion of the knee.

A 32-year-old male twisted his right ankle while shoveling coal and returned to work in a month. He was thought to have cellulitis and eventually had his veins ligated. This patient works from time to time, but ulcers recur.

Many of these patients with lower leg fractures or contusions are disabled because of venous insufficiency long after the orthopedic or traumatic surgeon has dismissed them as healed. In some cases, it may be thought that the patient is exaggerating his disability. Patients should not be pampered, but any patient with a limb that is swollen 2 to 4 cm. more than the other leg should be treated as if he were suffering from the effects of deep venous insufficiency, because it is impossible to tell whether the edema and cyanosis are due merely to loss of vascular tone and increased permeability of the vessels or whether the patient actually had a deep thrombophlebitis at the time of the original injury. Whatever the cause of the edema, if appropriate measures regarding management are not instituted, a serious disability will probably result. These patients deserve treatment to reduce the edema, because, if the edema is allowed to persist, it eventually becomes irreversible. The plasma outside the blood vessels tends to fibrose, and this fibrosis leads to some degree of anoxia of the skin, which, in turn, leads to further fibrosis and scarring of the lymphatics. Ultimately, the skin changes appear with the typical stigmata of chronic deep venous insufficiency. I am not sug-

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gesting that patients with soft tissue injuries and fractures of the lower leg should receive anticoagulants, because such treatment might cause certain complications. However, I feel that when plaster casts or other methods of immobilization or support are removed from these patients, it is of great importance to direct careful attention toward the management of the edema of the limb because, in some cases, deep thrombophlebitis will have occurred.

The surgical treatment of this form of thrombophlebitis includes various procedures, depending upon the stage of the thrombophlebitis and the nature of its complications. These measures include femoral or popliteal vein ligation, sympathectomy, and excision with skin graft.

My experience leads me to believe that the procedure of choice must be carefully selected on an individual basis in order to secure the most beneficial result.

Irrespective of this, however, by far the most important management is that outlined in the "New Way of Life," described by Luke¹ in 1950. This important communication stresses the mechanical measures necessary to prevent development of edema and avoid the consequent irreversible changes that will occur.

The patient is given typed instructions regarding the importance of intermittent high elevation, constant elastic support on the limbs when in a dependent position, and is warned of the dangers of strong soaps and actinic (sunburn) trauma. A genuine effort must be made to have the patient understand his or her condition. The only way dependent edema can be kept at a minimum is by intermittent elevation of the legs and properly applied elastic bandages or hose. The importance of these measures must be emphasized and re-emphasized!

It is my feeling from a practical point of view that it does not really matter whether the cause of chronic venous insufficiency is an actual thrombophlebitis or merely a temporary venous insufficiency occasioned by prolonged immobility and lack of muscular action. The effect is the same in both, although, of course, it is more severe in the former than the latter. A delay in returning to work and a recurring or permanent disability may be avoided if considerable attention is paid to the care and management of patients with edematous extremities which develop after injuries.

THROMBOPHLEBITIS IN UPPER EXTREMITIES

Venous thrombosis in the arm is of considerable interest. I do not refer to thrombosis induced by chemical irritation, such as occurs after in-

travenous injection of Diodrast or anesthetic agents, or thrombosis induced by stasis in the superior vena cava syndrome. However, I would like to draw attention to a type of venous thrombosis described as "Ideopathic Thrombosis of the Axillary Vein." French authors have a more descriptive term, "Thrombophlébite Axillaire Par Effort," which serves to distinguish it from thrombosis or thrombophlebitis caused by direct external injury. Rudolph Matas,² renewing attention to the condition in 1934, called it "Primary Thrombosis of the Axillary Vein Caused by Strain." Such a term is, perhaps, clumsy but does emphasize the most important factor in its etiology. The condition is of more than passing interest to a surgeon dealing with insurance or workmen's compensation cases.

Patients suffering from this type of thrombosis do not usually give a history of injury or accident but, if interrogated, will recall an incident of excessive muscular effort. The history of excessive muscular effort does not qualify a patient for workmen's compensation in Manitoba, as, under the terms of the Compensation Act, a patient is required to be injured by "accident" before the Compensation Board will accept responsibility for the injury. Accident may mean many things to many people, but I think the definition mentioned by Matas is a useful one, namely, "an unforeseen event directly or indirectly attributable to the sudden, violent action of external causes." Some of the causes of this type of thrombosis mentioned in the literature are hoisting heavy bales, heavy work with a hammer, lifting objects onto a high shelf, vigorous rowing, cracking a whip, and so forth. It is thought that the mechanism of injury is as follows. During extreme physical effort there is a coincidental extreme respiratory effort which causes the axillary vein to become distended so that it is more likely to be injured. Then, for instance, at the end of a rowing stroke, the clavicle is pulled downwards and backwards, and the anterior scalene muscle and the costocoracoid ligament produce pressure on the vein with consequent trauma, perhaps even causing a slight tear in the intima. It should be mentioned that, despite a history of strain, axillary thrombosis is a complex syndrome of polyvalent causation in which indirect trauma of the axillary vein and its immediate environment play the leading role. To show that there are other factors in the causation of the thrombosis besides strain, I should mention the case of one patient who required readmission two days after discharge from treatment for axillary vein thrombosis. Her admission was necessitated by a moderately severe iliofemoral throm-

bophlebitis. This, of course, suggested that some increase in the clotting mechanism was present.

The condition is characterized by signs and symptoms out of all proportion to the extent and degree of the trauma. The arm swells and becomes livid or even cyanotic. The edema can be firm or doughy. The veins over the chest wall may or may not be distended. Usually, the patients are young and muscular and employed in heavy labor. As might be expected, the sex incidence in the male and female is 4:1.

In my own cases, the diagnosis of axillary vein thrombosis has always been obvious and a venogram did not seem to be necessary, especially in view of the fact that injection of an opaque substance can itself cause venous thrombosis.

It should be mentioned that a roentgenogram of the thoracic inlet and mediastinum is obligatory to exclude lesions causing obstruction of the subclavian or innominate veins.

Most patients respond very well to conservative measures: namely, elevation, heat, and analgesics. The use of anticoagulants no doubt diminishes extension of the thrombosis, and, if

facilities exist for their use, such therapy is advisable. The majority of patients are relieved of their symptoms in seven to fourteen days, and the residua are minimal with none of the troublesome late complications occurring with venous insufficiency in the lower extremity.

If symptoms persist, exploration of the appropriate supraclavicular fossa should be done. In one such case requiring operation, I found an elongated transverse process of C₇ vertebra with a fibrous band extending from its tip to the first rib. Section of this resulted in cure.

No doubt some would advocate opening the vein and removing the thrombus, but this procedure carries an unnecessary risk of air embolism, recurring thrombosis, or embolism, and, in my opinion, it should not be done.

Finally, it should be generally recognized, as Matas stated, that there is a medicolegal difference between primary spontaneous thrombosis caused by muscular strain (indirect injury) and so-called spontaneous thrombosis, which occurs without history of accident, antecedent injury, or continued occupational strain.

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EXSANGUINATING HEMORRHAGE from alimentary tract diverticula is most apt to occur with extensive involvement of the colon. Although the exact mechanism of such hemorrhage remains obscure, infection is not incriminated. Local trauma producing ulceration is the most important etiologic factor.

Because of the infrequency of the condition, treatment has not been standardized. When bleeding is slight, and often when massive, rest, sedation, bland diet, and blood transfusions comprise satisfactory management. When bleeding continues and the source is localized, an elective resection of the diseased bowel is done. With massive bleeding from the entire colon, localization of the precise bleeding point is usually impossible and the necessary total or subtotal colectomy in this situation is a formidable procedure.

Simple diversion of the fecal stream controlled massive hemorrhage from diverticulosis in 2 patients. Since bleeding from the right colon seldom occurs, a transverse colostomy usually suffices. Definitive management can then be settled on an individual basis.

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Pilonidal Disease

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THE FOLLOWING METHOD of treating pilonidal disease has been published twice before^{1,2} and has been explained to several medical groups and societies. Because of the growing interest and the number of requests received recently, this simple method of treatment is presented again with a series of more than 1,000 cases to substantiate its efficiency.

Pilonidal disease is characterized by the presence of midline sinus tracts and associated cystic cavities usually found in the tissue over the lower sacrum and coccyx. Similar sinuses and cysts have been reported as occurring anterior to the anus, on the upper back, in the navel, and between the fingers of barbers. The condition is more common in hirsute white males. About half these cysts and sinuses contain hair. Sinuses and dimples in the sacrococcygeal area are seen frequently in children, but infected cysts are not. The condition usually becomes symptomatic between the ages of 18 and 30. These are the same years in which hydradenitis suppurativa is prevalent.

The cause of pilonidal disease is not yet known. The sinus tracts may be congenital, but there is no conclusive proof that they arise from epithelial arrests, remnants of the notochord, neurcentric canal, or preen glands as has been suggested by various authors. There is much reason to believe that the cysts, in contradistinction to the sinuses, are acquired and that they are caused when hair and detritus from the skin penetrate the sinus tracts and, along with bacteria, cause irritation and abscess formation.

Microscopically, pilonidal sinuses are found to be lined with stratified squamous epithelium. A cyst may be partially lined with stratified epithelium, but most of the cavity is lined with inflammatory tissue. Occasionally, hair follicles are found in a cyst cavity, but never are enough follicles seen to explain the mats of hair sometimes removed from pilonidal cysts. The hair in the

cysts is not attached to follicles and is easily lifted from the cavity. The amount and length of the hair is often sufficiently abundant to refute the theory that the hair in pilonidal cysts breaks off the back and lodges in the sinuses.

The symptoms of pilonidal disease are the same as those for localized subcutaneous infections anywhere in the body.

The number of operations described for the cure of this condition is fantastic. During World War II, a game was played in the Air Force in which a surgeon "dreamed up" a method of operating on pilonidal cysts. The literature was then searched, and usually a description of the "dream method" could be found. It was during World War II that the Air Force, as part of the routine physical examination for its members, looked specifically for pilonidal disease. As a consequence of this requirement, as many as 60 cases of pilonidal disease were present in some station hospitals at one time. This wealth of material provided an excellent opportunity for the study of this disorder. It was in such a hospital that the method of treatment presented here was developed.

After all reasonable methods of closure had been tried and proved unsatisfactory because of the recurrence rate, it was decided to try to find a better open method than a wide block dissection, which left a wound that required months to heal.

The first patients operated upon after this decision was made had their cysts and sinus tracts unroofed. Sections were then taken from various parts of the sinuses and cyst cavities, and drawings were made of the involved areas indicating the location of removed sections. These sections were examined microscopically, and the findings were considered in regard to the location from which they had been removed. It was concluded that the walls of pilonidal sinuses are covered by stratified squamous epithelium. This stratified squamous epithelium extends for varying distances into the cyst cavities but never completely lines them. Whether a cyst was ever completely lined with stratified epithelium, which was then partially destroyed by infection, was considered but rejected as unsubstan-

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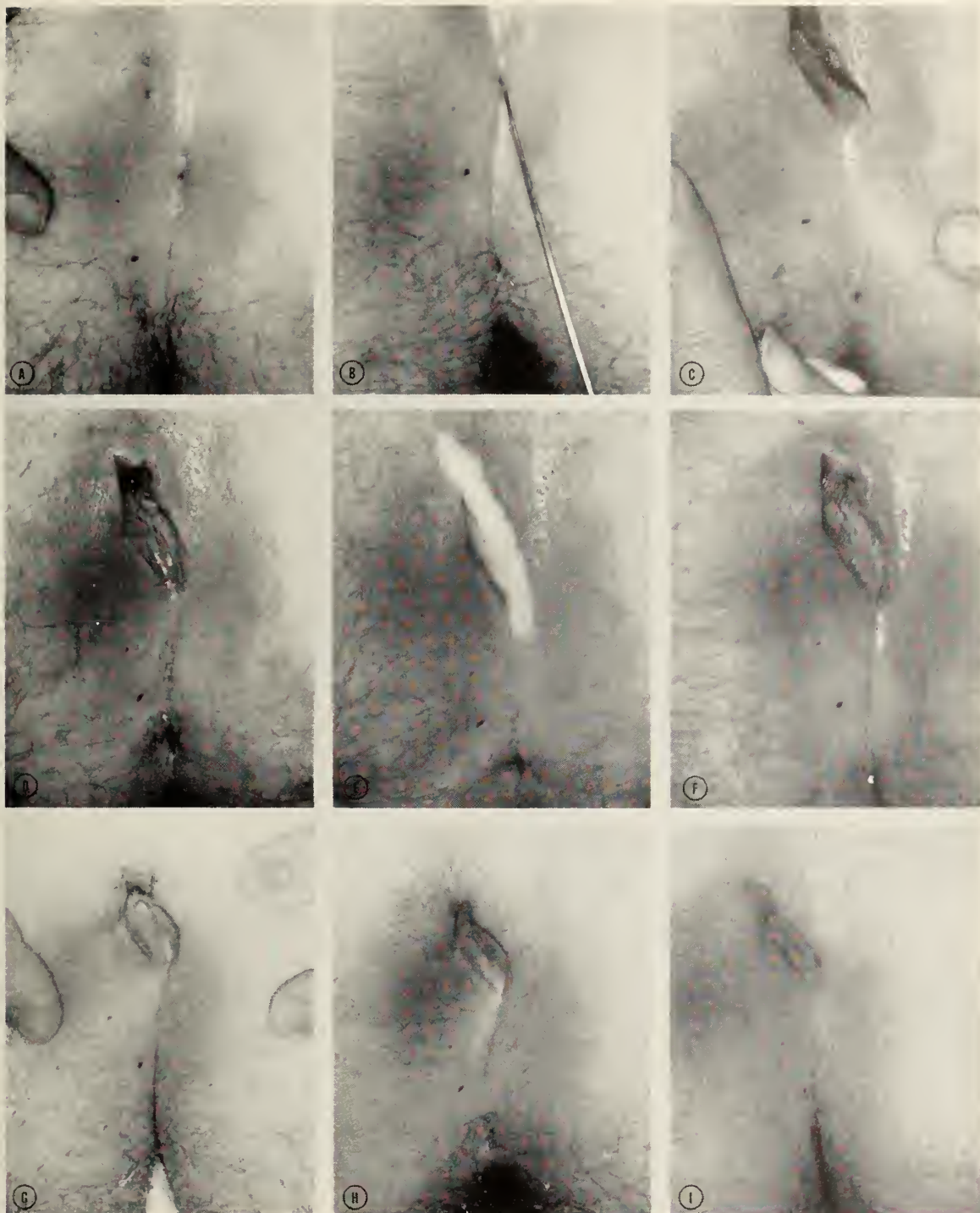


Fig. 1a. Preoperative picture of 2 congenital openings of pilonidal sinuses in the midline and an acquired opening above and to the left. (b). Probe in congenital sinus. (c). Tract slit open showing hair in sinus and cyst cavity. (d). Lining of sinus and cyst after being wiped free of hair and detritus. (e). Cotton saturated with 1:5,000 epinephrine solution in wound. (f). First postoperative day. (g). Eighth postoperative day. (h). Thirteenth postoperative day. (i). Twenty-second postoperative day.

tiated. It was more reasonable to assume that the pilonidal cyst was an abscess cavity caused by infection entering the lower end of a sinus tract and extending through its sweat glands or hair follicles into the surrounding tissue.

Whatever might have been the underlying cause of pilonidal cysts, they healed rapidly and with practically no recurrence when nothing was done but a simple unroofing and cleaning procedure. Also, healing was much more rapid than when a wide block dissection was made. In view of the success of this procedure, more and more of the roof of the cyst was allowed to remain in place until the present procedure evolved.

The method now used is simple. A probe is passed into the sinus tract or tracts and cavities, and the overlying tissue is separated with the scalpel or scissors. The lining so exposed is wiped clean with a piece of dry gauze. This lining is then examined and probed for side tracts or cavities. If found, they are slit open the same as the primary one. Palpating the tissue adjacent to the tracts may reveal induration, which indicates the presence of a side tract or cavity. This procedure helps the operator find all the involved areas. No tissue is removed unless the cavity or tract is deep and there is chance of the skin healing over before the wound is filled with granulations. The edges of these wounds are beveled in order to "saucerize" them and prevent bridging. No ties are used on bleeders if they can be avoided. The less foreign material in the wound, the better it will heal. Bleeders are pinched with hemostats and twisted. A piece of gauze saturated with 1:5,000 epinephrine solution or on a piece of Gelfoam or Oxycel is placed in the wound, and a pressure dressing is

applied. Occasionally, a persistent bleeder is found that requires control by electrical coagulation or even a tie, but this is avoided if possible.

Six to eight hours after operation, wet dressings of saline or boric acid solution are placed over the pressure dressing which was applied at operation. The next day, the pressure dressing is removed, but the wet dressings are continued. If bleeding has ceased, the patient is discharged from the hospital on the second postoperative day. The wet dressings are continued at home.

Twice each week following discharge from the hospital, the wound is examined and dressed in the office. At each visit, the entire healing area is observed for signs of delayed healing or openings to tracts that have been missed. If a tract is found, it is unroofed under local procaine anesthesia. Arcs in which granulations are not healthy are examined for the presence of a hair or other foreign material, which is removed if found.

It usually takes about ten days for all the granulations to become clean and healthy. The wet dressings are stopped at this time, and the patient is advised to place gauze covered with Furacin on the wound and to change the dressings three or four times a day. A sanitary belt and perineal pad are used to hold the wet dressings in place and also may be used to retain the Furacin dressings. Wet dressings are far more beneficial than any ointment or cream-based applications for the first ten days. After the wounds are clean, creams in water-miscible bases are most effective. Ointments with a petrolatum base delay healing even though they do contain antibiotics or antiseptics.

The known recurrence rate in these cases is

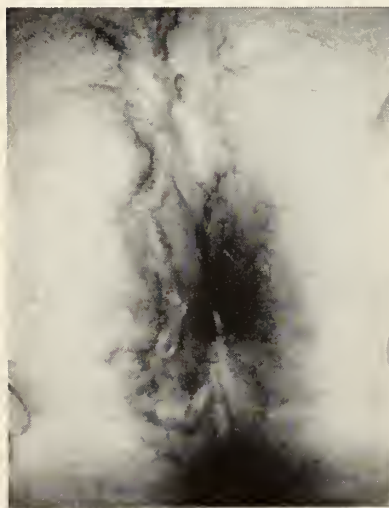


Fig. 2. Extensive scar fifty days postoperatively. Epithelization had been complete nine days.



Fig. 3. Scar of pilonidal wound seven years after operation.

less than 2 per cent, and recurrences are treated in the same manner as the original infection.

Since this method is contrary to the accepted teaching of the past, which states that all the lining of a pilonidal cyst or sinus must be removed in order to effect a cure, photographs of the operation and the healing wounds were taken as evidence of its validity. Some of these photographs are presented to show that the lining of a pilonidal cyst or sinus need not be removed in order to cure the condition (figure 1a through i). Two pictures (figures 2 and 3) of completely healed extensive scars are presented to show that large as well as small pilonidal cysts may be cured by this method. Figure 2 shows a scar seven weeks postoperatively, and figure 3 shows another scar seven years after the operation.

The average time required for complete epithelization in all cases is twenty-three days. Al-

though it has been impossible to obtain definite detailed statistics on all the cases that have been treated by this method during and since World War II, the number is well over 1,000 and the known recurrence rate is less than 2 per cent.

This method can be used in the office for small cysts and sinuses, but caution is urged because the extent of the procedure is not always known until the tract has been opened. The surgeon may find that a more extensive operation is required than he wishes to perform in the office.

SUMMARY

A well-tested and simple method of successfully treating pilonidal disease is again presented with additional cases fortifying the gratifying results previously reported.

Since this method is contrary to long-accepted beliefs and teaching, photographs are shown to verify the facts presented.

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NEEDLE BIOPSY of the kidney is a valuable procedure in the detection of organic renal disease, but it should not be performed unless the information to be gained is of definite worth. Renal biopsy may be used to differentiate multiple renal diseases in the nephrotic syndrome and to aid in the diagnosis of acute renal insufficiency and diffuse renal and vascular diseases. Often, the stage of the disease process is revealed, and subsequent specific therapy improves the prognosis.

Contraindications to renal biopsy include bleeding abnormalities; fulminating uremia; unilateral kidney; total anuria, unless a catheter is inserted and the pelvis is irrigated; renal abscess or tuberculosis; perinephritis; and malignant hypertension.

Biopsy, using local anesthesia and a Vim-Silverman needle, is performed with the patient in the prone position. Attempts to obtain a successful biopsy should be limited to 3.

Satisfactory renal tissue was obtained at first attempt in 137, or 91 per cent, of 150 patients. Subsequent biopsies were satisfactory in 10 of the remaining 13 subjects. Glomeruli averaged 16 per section.

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The Clinical Significance of Hoarseness and Related Voice Disorders

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WHAT is the chief function of the human larynx? It is the production of voice, all of us would agree, even though we remember the importance of this organ as guardian of the lower respiratory passages. This instinctive association between the human larynx and voice is not surprising, considering the unique position of voice and speech as the principal mediums of communication among men. It is attested by the translation of the Greek word "larynx" into the English vernacular "voice box." While the larynx plays a prominent role in many other functions, such as respiration, expectoration, deglutition, and fixation, these functions are duplicated in most vertebrates; but only man can "voice" his thoughts.

This distinctive human property, which excludes the use of laboratory animals for investigations, has retarded our understanding of the many complex phenomena which add up to the production of voice. Recent experiments, including the adaptation of ultra high speed cinematography, have produced a better understanding of the numerous physiologic derangements resulting in hoarseness and related voice disorders.

A few fundamental principles of laryngeal physiology will assist in a better understanding of these phenomena. In normal voice production, the lungs act as bellows which force air under pressure against the lower surfaces of the closed vocal cords, pushing them apart. Some of the air escapes through this opening until the vocal cords reapproximate—the result of their own elasticity and the reduced lateral pressure in the larynx. As soon as the subglottic pressure rises sufficiently to overcome the resistance of the vocal cords, the same cycle is repeated again and again. These alternations create puffs of air, which are perceived by the listener as

sound or, modified by the organs of the upper respiratory tract, as speech. The shorter the intervals between successive cycles, the greater the frequency of vibrations and the higher the pitch of the sound produced.

The process of voice production, therefore, involves (1) the larynx as the primary source of tone, (2) the chest as the source of the motive power, (3) the resonance chambers of the head and the pharynx, and (4) the related muscles and motor nerves. Any variation may and often does result in a change of sound, particularly if the disturbance affects some of the vital muscles in the larynx itself or their nerve supply. The great number and diversity of the intrinsic laryngeal muscles attest to the complexity and delicacy of the adjustments necessary for normal voice production, and the length of the recurrent laryngeal nerve renders this main motor nerve of the larynx particularly vulnerable.

Any modification of normal laryngeal function results in one of three characteristic changes in sound: A change in pitch, volume, or quality. A change in *pitch* depends upon the mass and tension of the vocal cords, not on their length, as erroneously assumed for many years. The *volume* varies with the pressure of the released pulsations, that is, relative changes in the vibratory cycle. Incomplete interruption of the air flow, the creation of turbulences, or a change in the vibratory pattern alter the *quality* of the voice and give rise to hoarseness. Loosely speaking, any change in the natural voice of an individual is often referred to as "hoarseness."

From this brief description, it is quite apparent that hoarseness is not a disease in itself but rather a symptom of disease in the larynx or along the course of the laryngeal motor nerve. Thus, hoarseness is the cardinal symptom of laryngeal involvement. It may result from faulty approximation of the cords, inadequate firmness of the cordal margins, or even slight changes in the vibratory pattern. It is often the first and only signal of serious local or systemic disease.

Several months ago, a patient consulted me with a history of progressive hoarseness. As she

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walked into the office, a slight limp was observed. When she was asked to grasp her tongue during the course of the examination, a wasting of the thenar eminence became evident. Indirect laryngoscopy showed a uniform weakness of both cords, as seen in cases of muscular atrophy. Somewhat rashly, I diagnosed amyotrophic lateral sclerosis and referred the patient to a neurologist who confirmed this diagnosis. On another recent occasion, I was asked to see a patient with hoarseness of recent onset. Indirect laryngoscopy revealed a weakness of one vocal cord, but a neurologic examination proved entirely negative. One week later, the unilateral paralysis was complete, and I was able to palpate a small, hard tumor at the thoracic inlet, largely obscured by the clavicle. Roentgenograms revealed an early malignancy of the alimentary tract. These two patients are representative of the many unusual cases in individuals who seek medical attention primarily because they or their associates have noted the symptom of hoarseness. Occasionally, the differential diagnosis may tax the ingenuity of the attending physician, since hoarseness may be a significant complaint in over 100 different medical and surgical conditions.

The most common benign cause of hoarseness, laryngitis, has been experienced by almost every adult at some time, and this familiarity "breeds contempt." As a result, many cases of laryngeal disease remain undiagnosed for weeks or months, while the opportunity for their successful eradication diminishes from day to day. Laryngeal cancer is not uncommon and, in its early stages, affords an excellent prognosis. Under these circumstances, who would quarrel with the old dictum that *all* patients with a hoarseness of more than three weeks' duration deserve the benefit of a laryngeal examination?

Such an examination must not be limited to a cursory view into the mouth or, perhaps, a brief glance into the throat. An adequate examination for hoarseness includes careful inspection of the nose, paranasal sinuses, the mouth, the nasopharynx and throat; a detailed study of the hypopharynx and larynx; palpation of the tongue, floor of the mouth, and the entire neck; and such additional examinations and laboratory studies as each individual case may warrant. If indirect laryngoscopy with local anesthesia does not permit complete visualization of the larynx, a direct laryngoscopic examination under topical, intravenous, or inhalation anesthesia is indicated. All suspicious lesions should be removed for biopsy, for every doubtful case must be considered malignant until proved otherwise.

In the past, many physicians and patients have been distressed by the difficulty experienced in evaluating certain mild cases of hoarseness or very early laryngeal lesions. The clinician has been handicapped by the inherent limitations of the human eye in distinguishing the rapid motions of the vocal cords, which vibrate at a rate of 200 to 400 cycles a second. Furthermore, in direct laryngoscopic examinations, the distortion of the normal anatomy by the introduction of the rigid instrument is often sufficient to obscure early changes in laryngeal function. Recent comparative cinematographic studies by Professor Paul Moore and the author, in normal and ultra slow motion, during which laryngeal vibrations are magnified 250 times, have demonstrated the value of such studies in the diagnosis of early functional abnormalities. With the perfection of the electronic synchron-stroboscope by Timcke and by Van den Berg, even minimal lesions of the vocal cords can be discovered and accurately interpreted. These recent additions to our diagnostic armamentarium should encourage the successful investigation and treatment of many baffling cases.

While hoarseness may be caused by an almost infinite variety of organic or functional disorders, this discussion will be limited to the more common clinical entities.

INTRINSIC LESIONS OF THE LARYNGEAL TISSUES

Inflammations. Inflammatory lesions comprise by far the major portion of all laryngeal disorders. *Acute laryngitis*, usually the result of an upper respiratory infection or excessive vocal use, is a self-limiting disease which responds readily to supportive measures, minimal use of the voice, and the avoidance of such irritants as smoke, alcohol, and hot food. The same applies to the specific laryngitis accompanying contagious or infectious diseases. Fortunately, with the advent of antibiotic therapy, diphtherial laryngitis, the dread scourge of past generations, has practically disappeared. I have seen only one case of this type at the Cook County Hospital during the past ten years. Early tracheotomy or intubation remains the treatment of choice in these isolated cases. The same advice holds true in children with acute laryngotracheobronchitis, where hoarseness acts as a warning signal of beginning laryngeal edema.

Chronic laryngitis may be caused by an infection of the upper respiratory tract, particularly a chronic sinusitis, or by a variety of irritants, such as vocal abuse, excessive smoking, or inhalation of dust or fumes. While the pathology

may vary, a reversal of the chronic changes may best be accomplished by elimination of the etiological factor, vocal temperance, and the abstention from local irritants. Gargles and troches have only psychologic value and may lure the patient into a false sense of security. For emphasis, it must be repeated that a diagnosis of chronic laryngitis should never be established until a thorough examination of the larynx has ruled out serious disease.

Laryngeal neoplasms. Laryngeal tumors follow inflammations in their incidence but far surpass them in importance. *Benign tumors* include polyps, fibromata, and cysts, which may readily be removed through the laryngoscope, and the juvenile papillomata, which often recur after excision. Vocal nodules or "singers' nodes" are small tumors commonly seen in entertainers or professional people. Frequently bilateral and located at the junction of the anterior and middle thirds of the vocal cords, they are the result of persistent vocal overuse. In their early stages, they are edematous and respond well to voice rest and voice therapy. When fibrosis has taken place, surgical removal becomes necessary.

Malignant tumors of the larynx are relatively common, comprising over 2 per cent of all malignancies. They strike principally in the fifth or sixth decades of life, and 10 times as often in men as in women. It cannot be stressed too strongly that hoarseness is usually the *only* manifestation of early laryngeal carcinoma. Pain, bleeding, dysphagia, dyspnea, stridor, and other symptoms do not occur until late in the disease. If confined to the vocal cords, carcinoma of the larynx shows an excellent prognosis. In small lesions, a cure may be predicted in 95 to 98 per cent, while the cure rate is still about 80 per cent when an entire cord is involved. The voice can be expected to be good in these patients following surgery. In expert hands, radiation may also produce very good results in early intrinsic laryngeal malignancies.

If the tumor has spread beyond the cords, however, the prognosis is less favorable, and removal of the lesion usually requires a laryngectomy, with or without radical neck dissection. By removing the organ of voice production, the patient is doomed to a permanent tracheostomy. In such cases, a new system of speech can usually be developed by utilizing the sphincteric muscles at the upper end of the esophagus. This striking contrast in the mortality and functional end results of incipient or advanced laryngeal carcinoma emphasizes more than many words the vital necessity for early diagnosis of all suspicious lesions of the larynx.

Allergies. Angioneurotic edema or other allergic conditions may involve the larynx and give rise to hoarseness and rapidly progressive obstruction. An emergency tracheotomy should be considered in acute cases to provide an airway until medical treatment can reverse the laryngeal manifestations.

Injuries. Traumatic lesions of the larynx may occur as the result of external injuries with fracture of the larynx, vocal abuse with cord hemorrhage, and gunshot wounds. Perhaps the most common cause of hoarseness in this category is the so-called "*contact ulcer*," resulting from traumatic vocal abuse. In this condition, a superficial ulceration develops on the medial surface of the vocal process of the arytenoid cartilage, which is exposed to constant hammering from its mate during the vibratory cycle. Since these ulcers are apt to recur, such patients deserve a thorough analysis of their vocal habits, followed by voice rest and indicated voice therapy. Slow motion cinematographic or stroboscopic studies often provide important information in these cases, while, in my opinion, surgical intervention is strictly contraindicated.

Persistent overexertion of the voice may also result in weakness of the laryngeal muscles, with associated hoarseness. This so-called *myasthenia laryngis* is characterized by faulty or inadequate approximation of the vocal cords on prolonged stimulation. It is not related to myasthenia gravis or any other systemic disease. Vocal temperance and voice therapy are effective countermeasures.

DISTURBANCES IN INNERVATION OF LARYNGEAL MUSCLES

Disturbances in the innervation of the laryngeal muscles may be of central or peripheral origin. In all cases, the treatment is that of the underlying disease, although voice therapy during convalescence may be helpful in improving the functional end result.

Disturbances of central origin. Central lesions include bulbar paralysis, which may be associated with numerous diseases of the central nervous system, multiple sclerosis, and tetanus. In these diseases, laryngeal involvement is commonly bilateral, consisting of weakness or paralysis of both vocal cords, with varying degrees of hoarseness and dyspnea. Tracheotomy is often necessary to maintain an adequate airway and to relieve the secretory obstruction of the lower respiratory passages.

Disturbances of peripheral origin. Impulses to the laryngeal muscles are carried by the vagus and recurrent laryngeal nerves — a long and exposed route. Thus, peripheral involvement of

the laryngeal nerve supply may stem from such widely different sources as pressure by a tumor in the neck or mediastinum, cardiac hypertrophy, an enlarged thyroid, or an aortic aneurysm. Injury of the recurrent laryngeal nerve, on the other hand, is usually the result of extensive thyroid surgery. While the degree of laryngeal paralysis varies from case to case, it is always unilateral except in rare instances of bilateral recurrent nerve injury during thyroid surgery. In patients with persistent unilateral vocal cord paralysis, the resulting hoarseness usually improves over a period of time as the uninvolved cord assumes the extra burden. Thus, complete functional compensation may take place as the result of effective adjustment to the altered physiologic status.

Peripheral neuritis of the recurrent laryngeal nerve may occur as a complication of influenza or other virus diseases or in alcohol poisoning. In these cases, the resulting paralysis and hoarseness may be permanent, but it is often temporary, with normal function completely restored.

LARYNGEAL MANIFESTATIONS OF SYSTEMIC DISEASE

Laryngeal manifestations of systemic disease are far more frequent than is generally assumed. Mild forms of hoarseness are often the result of endocrine disorders, particularly during altered thyroid metabolism. Muscular dystrophies may affect the intrinsic muscles of the larynx, with a resultant weakness in activity and functional results. In many of these cases, slow motion studies by synchron-stroboscopy or ultra high-speed photography are necessary to detect the slight functional changes.

Tuberculosis of the larynx is rarely, if ever, primary. With the decrease in active pulmonary lesions, laryngeal tuberculosis is seen less and less frequently. Hoarseness is commonly associated with pain in laryngeal tuberculosis, but fortunately streptomycin provides a specific rem-

edy. In this country, *syphilis* of the larynx has become extremely rare.

VOCAL CHANGES WITHOUT DEMONSTRABLE PATHOLOGY

Emotional disturbances or psychic trauma are frequently responsible for psychosomatic hoarseness or even aphonia. As opposed to organic disorders, such patients often produce clear sounds when encouraged to sing or hum individual vowels or when their attention is channeled in other directions. Psychosomatic aphonias may be readily differentiated from organic paralyses by observing the normal approximation of the vocal cords while the patient coughs or clears his throat. The peculiar history of these cases and the associated psychologic manifestations usually lead to the correct diagnosis, but the treatment may prove unexpectedly difficult and often requires prolonged psychiatric supervision.

SUMMARY

This discussion of hoarseness and related voice disorders points to the following conclusions concerning their clinical significance:

1. Hoarseness is the cardinal symptom of laryngeal disease.
2. Hoarseness of more than three weeks' duration must be considered serious unless proved otherwise.
3. Patients with persistent hoarseness deserve a thorough laryngeal examination.
4. While hoarseness occurs in many different systemic diseases, carcinoma of the larynx may also occur in the presence of other diseases.
5. Early diagnosis and treatment of intrinsic laryngeal malignancies produce excellent curative and functional results.
6. Newer additions to the diagnostic armamentarium of the laryngologist permit a better evaluation of early laryngeal lesions.
7. In benign lesions of the larynx, voice therapy is often a useful adjuvant to indicated medical or surgical treatment.

Ovarian Tumors

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A DISCUSSION OF OVARIAN TUMORS requires consideration of a variety of important and interesting neoplasms. We will not attempt to review figures indicating the incidence of these varied tumors or consider the ages at which each is most likely to be discovered. There seems little reason to describe findings which might suggest that a cystoma is of one type or another. We will try, however, to review some of the points concerning ovarian tumors which may be of interest and of some practical value to the physician in general practice.

There should be little need to emphasize the importance of first determining, especially when the patient is young, whether the tumor is a non-neoplastic dysfunctionally cystic enlargement or a true neoplasm. Particularly, when the tumor is no larger than the proverbial lemon, re-examination after a few weeks usually provides a satisfactory means of differentiating cystic ovaries and true cystomas. In younger women, when ovarian enlargement has been observed to persist through several menstrual cycles, the presence of a true neoplasm becomes evident and laparotomy is indicated. If the patient is over 40, however, it is well to remember that dysfunctional cysts are less likely. Palpation of the ovaries is particularly important after the menopause, when, unfortunately, postmenopausal changes make the ovaries difficult to outline. In older women, any enlargement should be regarded with apprehension, and laparotomy is indicated if the impression of appreciable ovarian enlargement seems confirmed by examination under anesthesia.

Irregular bleeding is more apt to occur when ovarian enlargement is due to dysfunctional cystic changes and less likely with truly neoplastic enlargement of the ovary. Nonfunctioning tumors of the ovary are not apt to be associated with abnormal uterine bleeding.

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It is interesting that tumors have been reported to develop more frequently in the left ovary than in the right—in a ratio approximating 4 on the right to 3 on the left side.

It would be well to remember that chocolate cysts due to ovarian endometriosis may be present, though the patient does not complain of the acquired type of dysmenorrhea so frequently associated in our minds with endometriosis. When chocolate cysts of the ovary are encountered and dysmenorrhea has been a complaint, it is equally important to remember that ovarian resection alone will probably not relieve the patient's dysmenorrhea. Such menstrual pain is usually due to adenomyosis, and a presacral nerve resection or hysterectomy is usually necessary when dysmenorrhea is a major complaint.

While chocolate cysts are the most frequent neoplastic cause of ovarian enlargement, the dermoid or the benign teratoma, as it is now so frequently called, is the type of true cystoma most frequently encountered. Teratomas are not all dermoids, and all are not benign. Too often, a solid teratoma is regarded as likely to be malignant, and a cystic tumor is considered probably benign. Actually, a solid teratoma may prove to be benign, and the possibility of squamous-cell carcinoma in a dermoid should not be forgotten. Over 100 such cases have been reported and, though the incidence is difficult to determine, it must be something approximating 1 per cent. The frequency with which dermoids involve both ovaries has been the subject of considerable discussion. The larger series of reported cases suggest the probability that bilateral occurrence is less than 15 per cent.

The cystadenomas are probably the next most frequent group of ovarian neoplasms. Here, a careful appraisal becomes increasingly important. So-called simple cystomas are usually unilocular and often pseudomucinous. As soon as an ovarian cyst has been removed from the abdomen, it should be opened in order to determine if the lining is smooth or grossly papillary. Removal without rupture of the cyst helps preserve surgical ego and is generally considered desirable. This practice involves removal of the entire ovary, however, and disregards the possi-

bility of resecting a benign cystoma from uninvolved perfectly normal portions of the ovary. When the woman is under 50 years of age and the tumor appears to be unilateral, the chance of malignancy is slight. Under such circumstances, spill of the cyst content into the peritoneal cavity as a result of attempting to preserve a portion of the ovary is hardly to be regarded as a technical tragedy. We have repeatedly noted that pseudomyxoma peritonei develops only when a tendency to penetrate the capsule and implant spontaneously onto adjacent peritoneum was evident the first time the abdomen was opened. We have to date observed no instance in which the spill of the contents of a pseudomucinous cystoma resulted in the peritoneal seeding of an implanting tumor if that tendency was not evident when the abdomen was first opened. Whenever the tumor is unilateral, the opposite, apparently uninvolved looking ovary should be bisected in order to make certain that it shows no evidence of beginning neoplasm before we decide it can be preserved as the involved side is removed.

If the tumor is bilateral, the chances of malignancy are increased. Should bilateral cystomas appear benign, however, it might be particularly desirable to preserve as much ovarian tissue as possible. Usually, the appearance of one side suggests the possibility of resection rather than of oophorectomy, and it is well to begin on the side which looks as though the ovarian tissue would be easier to preserve. If there is no evidence of implantation and there are no adhesions to the surface, by protecting adjacent structures with gauze packing, the cystoma can usually be resected from the ovarian tissue adjacent to the pedicle and its blood supply. The removed cyst should then be opened. If the gross appearance does not suggest malignancy, an attempt should be made to handle the opposite side in a similar manner. If the opened cyst shows a grossly papillary lining, it is better to await the pathologist's opinion concerning the probable malignancy of the neoplasm. If the neoplasm is considered malignant, the previously preserved grossly uninvolved portion of the resected ovary, its adjacent tube, the uterus, the opposite adnexa, and the omentum should be removed.

Some of the less common ovarian neoplasms present features of unusual interest. The so-called Krukenberg tumor, for example, always seems to be remembered, though other more frequently occurring varieties may have been forgotten. It is usually bilateral, presents a nodular uneven surface, and is usually free of adhesions. The cut surface shows dense areas alter-

nating with soft myxomatous portions, and, on histologic section, the characteristic ring cells are pathognomonic. It is interesting to note that while Krukenberg¹ is generally credited with an accurate description of both the gross appearance and the histology of this tumor, as originally reported in 1896, he apparently did not recognize that the tumors were of secondary or metastatic nature. Within eight years, however, others had established the fact that the tumors Krukenberg had described were usually metastatic from a primary in the intestinal tract. Perhaps a "primary" Krukenberg may occasionally be found. At least, on several occasions, grossly and histologically typical looking neoplasms have never developed evidence of a primary after the ovarian growths were removed.

The incidence of the Krukenberg tumor approximates 5 per 100 ovarian malignancies. The practical importance of this tumor is, however, considerably greater than its incidence indicates. The mere possibility of this lesion serves to remind us that pelvic neoplasms may be associated with neoplasms of the bowel. Preoperative roentgenograms are advisable, and it is often wise to prepare the patient psychologically, as well as with antibiotics, for a possible resection of bowel. A mass, from a clinical standpoint, considered to be of ovarian origin may, in reality, prove at operation to be of intestinal origin. This fact quite possibly could be demonstrated by preoperative roentgenograms, and, under such circumstances, preoperative preparation of the bowel with antibiotics would certainly be desirable. It is well to consider, also, prophylactic removal of the ovaries when a malignancy of the bowel, particularly gastric carcinoma, is being resected. While this measure has not been employed sufficiently often to permit its evaluation, at least from a theoretic standpoint, prophylactic oophorectomy should be considered as a means of avoiding the subsequent development of Krukenberg tumors.

The so-called functioning ovarian tumors may have either a feminizing or masculinizing effect but are often "defeminizing" rather than masculinizing. Among functioning tumors, those with a feminizing effect predominate in a ratio approximating 4 to 1. Novak² has estimated that granulosa cell carcinoma and the thecomas together comprise approximately 10 per cent of all solid malignant growths of the ovary and might well be suspected whenever relatively solid tumors of the ovary are encountered. In recent years, reports have suggested that relatively light irradiation into the pelvis may eventually result in a significantly increased incidence of femin-

izing tumors. At present, however, there does not seem to be a history of irradiation in the background of a significant number of the patients in whom granulosa or theca-cell tumors of the ovary have developed.

When extensive lutein-like changes are evident, the term luteoma may be employed, but even when such extensive luteinization is evident, the biologic effect of such tumors is purely estrogenic. A present tendency is to regard luteoma as a histologic picture occasionally predominant in thecomas as opposed to consideration of the luteoma as a separate entity. While two histologically different neoplasms have been described, nevertheless, the two may be found within the same neoplasm. When feminizing tumors develop in children, "precocious menstruation" may occur, but it is anovulatory bleeding and such children should not conceive. Evidences of ovulation or the occurrence of pregnancy would, therefore, indicate constitutionally precocious development rather than the development of a feminizing tumor.

The malignant potentiality of feminizing tumors remains a question. Novak has suggested that 25 to 33 per cent of functioning ovarian tumors can be expected to recur at least locally. Granulosa-cell tumors, though histologically benign, have been reported to recur in the pelvis fifteen years and more after apparently complete removal of the primary lesion. In the majority of instances, when granulosa cell tumors do recur, they do so locally and are clinically of a rather low grade of malignancy. Occasionally, granulosa-cell carcinoma may be associated with the development of abdominal carcinomatosis and prove rapidly fatal in a manner similar to primary carcinoma of the ovary. Thecomas are relatively benign. Feminizing tumors may, however, contribute in a less direct manner to the development of malignancy in the female. In postmenopausal women, the long sustained production of estrogen by feminizing tumors occasionally precedes the development of endometrial carcinoma. Thecomas may be particularly potent in their estrogenic activity and have most frequently been associated with the development of adenocarcinoma in the uterus.

Tumors causing defeminization or masculinization may be any of 4 types: (1) arrhenoblastoma, (2) adrenal-like tumors, (3) masculinoblastoma, and (4) hilus cell tumors.

The less endocrinologically active tumors, with a so-called defeminization effect, account for amenorrhea and regression of the breasts. The more actively androgenic neoplasms produce hirsutism, enlargement of the clitoris, and deep-

ening of the voice. Therefore, some type of androgenic tumor might well be suspected when a woman, previously feminine in appearance, begins to exhibit changes suggestive of either defeminization or masculinization. As a general rule, such changes tend to regress after removal of the androgenic neoplasm.

The arrhenoblastoma is the classical example of the masculinizing tumor and histologically suggests attempts to reproduce testicular tissue. Many such tumors are nonfunctioning, however, which observation Novak suggests may indicate that the smaller, nonfunctioning ones may be but an embryonic vestige of testicular tissue. Some of the more undifferentiated arrhenoblastomas have been considered sarcomas.

The adrenal-like tumors of the ovary have been considered by Novak to be the result of adrenal cell inclusion within the ovarian anlage, and they are of importance because their development may produce the clinical picture of a Cushing's syndrome, similar to that observed with the development of a tumor of the adrenal cortex.

The masculinoblastomas, once called "masculinizing luteomas" are relatively rare—less than 30 cases have been reported to date. Frequently, the tumors are so small that an adnexal mass is not evident but, when discovered, appear encapsulated, present a yellow surface on cut section, and microscopically suggest a luteoma or hypernephroma. They are associated with increased 17-ketosteroids, amenorrhea, hirsutism, enlargement of the clitoris, and hypertension.

Evidence of defeminization should also suggest the possibility of a so-called hilus cell tumor of the ovary. These may be particularly difficult for the clinician to detect, since reported cases have involved tumors no larger than a normal ovary. Nests of large ovoid cells similar to the Leydig cells of the testes may develop in the medullary portion of the ovary. Though masculinization may develop, it appears without the hypertension characteristic of the masculinoblastoma.

Meigs's³ classical description of the syndrome which bears his name has undoubtedly stimulated the clinicians' interest in the possibility of determining the nature of ovarian neoplasms by preoperative study of the patient. Meigs's observation that benign fibromas of the ovary could be associated with ascites and hydrothorax has resulted in many attempts to recognize the entity. Many have considered cystic tumors with associated ascites and hydrothorax as examples of this syndrome. The triad of pelvic tumor, ascites, and hydrothorax has been reported with

benign ovarian cystomas, leiomyomas, teratomas, malignancies of the ovary, with trauma, and with carcinoma of the pancreas. Meigs believes, however, that the syndrome should be restricted to the triad of: (1) a fibroma-like tumor of the ovary, (2) ascitic fluid in the abdomen and a hydrothorax, and (3) disappearance of both the ascitic fluid and the fluid within the chest after the ovarian fibroma or fibromas have been removed. He has, moreover, recently re-emphasized his criteria, while at the same time giving credit to two older clinicians who, since Meigs's original description, had been recognized as having contributed published reports regarding this syndrome some years previously.

Meigs's syndrome is so well known that when internists and roentgenologists recognize hydrothorax, they often wonder whether a pelvic neoplasm could account for the fluid in the chest. I have yet to find an unsuspected fibroma of the ovary when discovery of a hydrothorax was the first evidence of pathology. We have observed two typical instances of Meigs's syndrome, but, in each instance, there was a clinical suspicion of ascites, the pelvic tumor was readily identified on examination, and the hydrothorax was the last feature of the syndrome to be identified. The source of the ascitic fluid was long a source of considerable speculation. It now seems generally accepted, however, that the fibromas are edematous and leak fluid into the peritoneal cavity, from which it finds its way above the right diaphragm.

Gynecologists of considerable clinical experience have perpetuated a belief that solid tumors of the ovary are more likely to cause pain than cystomas, though, personally, I have yet to see the patient whose complaint of pelvic pain was explained by the discovery of a fibroma in her pelvis.

When the appearance of the cystoma suggests malignancy and it appears possible to remove both adnexa and the uterus, it is well to make as clean and complete an excision as possible. Excision of parietal peritoneum, particularly in the cul-de-sac and along the posterior surfaces of the broad ligaments, usually results in a much more adequate resection. Exenterations have taught us that a pelvis so denuded quickly re-peritonealizes, or a redundant loop of sigmoid may often be utilized to at least partially cover the floor of the dissected pelvis. When ovarian malignancy appears locally invasive, Kottmeier⁴ has stressed the advisability of saving the uterus. If involvement of the mesosigmoid and pararectal tissues suggests the probability that excision of the tumor will be incomplete, he be-

lieves it is better to preserve the uterus as a point from which unremoved tumor can be irradiated. This modification is recommended, however, only when it is suspected that removal of the malignant tissue will be incomplete.

In the management of ovarian carcinoma, some attempt to classify or clinically "stage" the malignancy would be helpful from a prognostic standpoint. A simple but clinical and practical classification would be somewhat as follows:

Stage 1. Carcinoma limited to one ovary.

2. Carcinoma involving both ovaries but with no grossly appreciable extension outside the uterus and adnexa.

3. Ovarian malignancy considered inoperable because of obvious extension into adjacent tissues.

4. Inoperable ovarian carcinoma with evident carcinomatosis of the abdomen, involvement of the omentum, extensive peritoneal implantation, and/or distant metastasis.

The dissemination of ovarian malignancy is not inhibited by even so much as a peritoneal covering over the ovary. Early dissemination is likely, and the omentum is involved early. Its removal at the time of initial surgery is a palliative measure worth consideration, for the development of a large "omental cake" often adds considerably to abdominal distention and discomfort. While fairly extensive pelvic dissection, including the stripping of parietal peritoneum off of the bladder, broad ligaments, and cul-de-sac may contribute to a more complete excision and a better clinical result when the lesion appears operable, resection of involved loops of bowel and heroically extensive surgery in the pelvis seem to have no place in the management of ovarian malignancy. The surgeon's sense of frustration is based upon the fact that ovarian malignancy usually and rapidly involves tributaries of the portal system. Extension into the upper abdomen and liver seems inevitable no matter how extensive the pelvic excision might have been.

Occasionally, the surgical procedure may have been completed before the malignant character of an ovarian tumor was recognized. When the diagnosis of carcinoma of the ovary is a post-operative surprise and only one ovary has been removed, more adequate surgery should not be delayed. A second operation, with removal of the uterus, remaining adnexa, adjacent portions of the peritoneum, and the entire omentum, improves the possibility of a longer survival.

The effectiveness of postoperative irradiation is not predictable, but, in the individual case, its use may seem of great benefit. A full therapeutic trial is indicated. The use of intraperitoneal colloidal gold as a source of irradiation should be limited to cases in which spill has

occurred or purely prophylactic irradiation is considered advisable. If there are any remnants of tumor in the abdomen, external irradiation is far more effective. The irradiation from activated gold may be sufficient to inhibit the reformation of ascitic fluid, and it is very well tolerated by the patient, but it seems quite inadequate when grossly appreciable foci of tumor indicate treatment. Recent reports seem to indicate that some of the newer "nitrogen mustards" are much more effective when recurrence is evident, and ascitic or pleural effusion adds greatly to the patient's discomfort.

The so-called mesonephric carcinomas of the ovary continue to be a source of some confusion. As a rule, this tumor is relatively large, presents a round, smooth surface, and, on cut section, appears semisolid except for pseudocystic areas of degeneration frequently noted within an otherwise smoothly solid neoplasm. The growth tends to break through its capsule. Malignancy is evident when penetration of the capsule and metastatic implantation occur. Metastatic nodules have a noticeably yellow appearance. Approximately half of the reported cases have been highly malignant, while many others have evidenced a surprisingly benign course. These tumors frequently develop after the menopause and may be associated with the development of ascites. The term mesonephroma was first suggested in 1939 by Schiller⁵ who noted that the histology suggested rudimentary glomeruli in some areas. Schiller also noted that this neoplasm may also be found as an intraligamentous tumor, which characteristic has been particularly emphasized by Gardner and associates.⁶ The latter have recognized, however, that these neoplasms are of mesonephric rather than of ovarian origin.

The various types of neoplasms arising in the female pelvis, which were thought to be of mesonephric origin, have recently been described by Novak⁷ as follows:

1. The classical mesonephroma of Schiller, which may seem to be arising in the ovary.
2. The clear cell carcinomas of the ovary, which may coexist with or develop within a mesonephroma.
3. The mesonephric tumors developing within the broad ligament.
4. Cervical and vaginal tumors of mesonephric origin.

When the latter develop in the cervix, the histologic appearance suggests a cystadenoma or an adenocarcinoma. Development of the more myxomatous of the mesonephric tumors within the vagina may result in a papillary growth confused with sarcoma botryoids.

Increased knowledge of the nature of ovarian neoplasms and improved management of the

patients affected are unfortunately evident only when the neoplasms are benign. To date, little progress has been made toward decreasing the number of deaths due to ovarian malignancies. As we contemplate possible approaches to this problem, the futility of frequent and periodic routine pelvic examination might well be recognized. Annual pelvic examination appears to offer little hope of detecting malignancies of the ovary in a curable state. During the years Macfarlane⁸ and her co-workers repeatedly examined a number of volunteers who came in regularly every six months or every year, among 18,000 such routine examinations, 6 carcinomas of the ovary were detected. Among the 6, only 1 was considered early enough to be curable. Every study of this problem emphasizes the rapidity with which ovarian malignancy progresses to an inoperable stage. Available data suggest the probability that, if all women were examined once a year, an ovarian malignancy would have developed in approximately 3 among each 10,000 during the year, but that only 1 of the 3 neoplasms would be in a favorably early stage of its development.

Small wonder then that there is an increasing tendency to take out ovaries on a prophylactic basis. The risk of leaving the ovary at the time of hysterectomy has been the subject of considerable discussion. Grogan and Dunean,⁹ of Boston Free Hospital, stated that complaints or a pelvic tumor developed in 33 per cent of patients with ovaries preserved at the time of hysterectomy, which was regarded as evidence that the ovaries should have been removed. Fagen and associates,¹⁰ of Chicago Presbyterian Hospital, found that 7 per cent of 172 women who came into their hospital for treatment of an ovarian carcinoma had previously had a pelvic laparotomy at which time the ovaries might have been removed. Such observations suggest the advisability of attempts to calculate the risk of preserving the ovary.

Among the 9 per 1,000 women now destined to develop an ovarian carcinoma, we might well ask—how many of those ovarian carcinomas could we prevent by removing both ovaries each time a hysterectomy is indicated? This obviously would depend upon the incidence of hysterectomy, but, if it is 10 per cent, we could reduce the over-all incidence of ovarian carcinoma by 10 per cent, that is, from 9 to approximately 8 cases per 1,000 women simply by removing both ovaries each time a hysterectomy is indicated. We would expect the incidence of ovarian carcinoma, among women previously subjected to hysterectomy, to be the same as

among the population at large, namely, approximately 9 cases per 1,000 women. Actually, Allen followed 2,097 women to see how many had developed a carcinoma of their preserved ovaries and found not the 19 cases we would expect in such a group from the incidence of ovarian malignancy among the population at large but 63 cases, an incidence 3 times what we might expect. Well might we ask: (1) If women subjected to hysterectomy are predisposed to the formation of malignant neoplasms of the ovary by changes which follow hysterectomy? (2) If the same benign uterine neoplasms or the loss of uterine support or the hemorrhagic menstrual tendencies—which originally indicated hysterectomy among these women—resulted in a greater than average incidence of ovarian malignancy? or (3) Is such sampling inadequate? Should such figures be regarded as significant?

The answers to many such important questions await data that careful observation should eventually provide. Since, at the present time, there seems to be no means of recognizing which women are predisposed to the development of ovarian carcinoma, the question remains one of deciding whether a 1 per cent chance of a malignant tumor of the ovary justifies prophylactic oophorectomy when laparotomy is performed for other indications and the woman is approaching her climacteric.

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BENIGN CONGENITAL HYPOTONIA in infants may be manifested by generalized weakness of the skeletal muscles. The nonprogressive congenital neuromuscular abnormality should be differentiated from amyotonia congenita. Physical examination shows that the child is limp. Neuromuscular development is delayed. Weakness may be greater in some muscle groups or may be uniform throughout the trunk and limbs. No pseudohypertrophy is observed.

Electrical testing of muscles by the faradic-galvanic method reveals no abnormality; electromyograms show excessive polyphasic and short-duration potentials during voluntary contraction of affected muscles. No pathogenic alterations are observed in muscle biopsy specimens.

In 8 children with benign congenital hypotonia who recovered completely, fetal movements had been normal. The deep tendon reflexes could be elicited but were sometimes diminished. Intellectual development was normal. Muscle tonus returned to normal by the fifteenth year of life or before.

In 9 patients, symptoms were more severe; fetal movements had been reduced in 1 case. Deep tendon reflexes were lacking in 3, depressed in 4, normal in 1, and brisk in 1 patient. Intercostal weakness was noted in 3 instances. Some muscular weakness persisted in these patients.

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Colic in Infancy

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COLIC IN INFANCY is one of those very useful terms like "flu" and "constitution," which are very specific diagnoses in the minds of the laity but very broad in their compass when used by the profession. When this diagnosis is made, it is accepted by the parents and they know that it is something they must "put up with" for three to five months and that the child will recover.

Colic has been defined in some texts by a description of the symptomatology as a condition characterized by crying, drawing the legs up, distention of the abdomen, and expulsion of gas by mouth, rectum, or both. These same articles also state that the condition usually lasts three to five months. The first time the term came to my attention, shortly after entering practice, was from a grandmother who sagely stated the new baby had "three months' colic."

Although it may be necessary to use this term or so-called diagnosis, it is a mistake to accept the situation as inevitable. From personal experience, it has frequently been possible to find other solutions for the etiology.

The causes of feeding or nutritional disturbances in infancy may be divided into some 7 categories. In order of their frequency they are:

1. Infections, acute or chronic
2. Congenital anomalies and incidents associated with birth
3. Environmental conditions
4. Feeding disturbances, quantity or quality
5. Psychoneurotic disturbances
6. Allergy
7. Endocrine and metabolic disturbances

Infections. The onset of infection is the most common cause of "colic," abdominal distention, and so forth in a previously healthy infant with uneventful feedings. Infections account for the largest number of digestive disturbances.

Congenital anomalies. Congenital anomalies involve any part of the body. Those of the heart are frequently associated with symptoms attrib-

utable to the gastrointestinal tract, which could be called "colic." The gastrointestinal tract frequently has stenosis, bands, or malrotation which may produce these symptoms. One of the most frequently overlooked is the rectosigmoid region. Two conditions in this area require special emphasis.

The history of a baby reveals spells of crying, distention, and gas, which are often associated with meals. This fussy period occurs after meals and often is associated with some straining and attempts at evacuation which may be successful. If one asks if there is trouble with bowel movements, the answer is frequently "No, the baby has frequent passages." The character of the movement may be loose or ribbon-like. This information is obtained only by direct questioning. Rectal examination should always be done on a "colicky" baby unless an adequate cause for the condition can be found otherwise. The first condition that may be found is a tight fibrous rectal opening about the size of a lead pencil. The rectum in a young baby need not be larger than this, but it may be dilated slowly to the size of a small index finger. In this condition, there is a fibrous ring inside the sphincter. When this has been stretched, in many instances, the "colic" immediately clears. It is frequently necessary to dilate the rectum on two or three occasions subsequently at weekly intervals.

The second condition found in this area is the so-called redundant sigmoid. The descending colon usually curves to the right across the pelvis and then back to the rectum. In this type of case, the sigmoid curves across to the right, then down into the pelvis, back up, and down into the rectum, forming a very sharp S curve similar to a sewer trap. Examination by rectum reveals an empty area in the rectum, but fecal matter can be felt in the pelvis in the bowel immediately adjacent to the rectum and packed well into the pelvis. After advancing the finger up around the first bend, a large quantity of stool is immediately released. In this type of case, the mother invariably says that the baby has regular movements, but the fact is that the baby is one or two days late. The stool that is passed today is pushed along by the fecal material behind it so

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that the baby's sigmoid and colon are constantly full.

This condition invariably rights itself as the baby's trunk becomes elongated, thus pulling the sigmoid out of the pelvis, but it may last as long as two years. This type of patient is relieved by an enema of baking soda, $\frac{1}{2}$ to 1 tsp. in 4 to 10 oz. of water. This straightens out the trap-like effect in the rectosigmoid and usually gives relief for about two days if the enema has been effective. Suppositories or soap sticks should never be used. They only make the condition worse and possibly lead to the development of prolapse. An unexplained but frequently dramatic procedure in treatment of this condition is the use of the barium enema. It is possible that the heavy solution and pressure with palpation and manipulation necessary to properly visualize the bowel forces the sigmoid out of the pelvis and straightens it. Invariably, when the barium enema is administered correctly, the radiologist is unable to demonstrate the sigmoid colon packed down in the pelvis, but, peculiarly enough, the child's symptoms nearly always disappear after this procedure. This is a situation in which a diagnostic measure acts in a therapeutic way similar to the demonstration and reduction of intussusception.

Incidents associated with birth, such as cerebral damage from hypoxia, edema, or hemorrhage, are frequently unrecognizable in the early period of life. It has been the experience of all pediatricians to discover after six months or a year that a baby who is high-strung and cries all the time is mentally retarded because of cerebral palsy. Many of these infants were treated for colic, hypertonia, and other conditions until the true underlying cause became manifest. There is no way of recognizing mental deficiency in the first few months of life except, possibly, from an electroencephalogram, but every crying baby could not be subjected to this procedure. However, with a history suggestive of some problem at the time of birth, the possibility of an abnormal mental condition should be kept in mind. In addition, unrecognized fractures may cause symptoms suggestive of colic.

Environmental conditions. If environmental conditions were successfully eliminated, pediatricians in this country would certainly become entirely a consulting practice.

These conditions include the way the baby is handled and fed, the temperament of the others in the home, the home itself, and all the other things which impinge on this new life which has been taken from a place of complete protection in the uterus to one where it must

fight against outside factors for its very existence. True, this struggle is aided by others, such as parents, nurses, and doctors, but their efforts may produce stimuli which upset the baby. These elements are the largest cause of colic in the very young baby.

Temperature and humidity are usually not big factors. The most frequently encountered problem occurs in the artificially fed baby. Mothers have read the books and are impressed by the danger of a nipple with too large a hole. Nipples are invariably sold with holes in them so small that even a husky grown man would have difficulty in extracting a feeding. The mothers say the feeding goes fast enough. Even heat the bottle up and turn it over and a spurt of liquid is seen. However, after that first fluid goes out due to the pressure of the heated air in the bottle, nothing follows. One is always impressed by the size of the nipple holes in nurseries and pediatric wards where the nurses do not have all day to feed a baby. The babies do not have colic or do they choke on or vomit feedings if fed intelligently. The mother should be instructed how to use the bottle properly, and it is well to give a practical demonstration. The nipple should have dual holes large enough to see through each a letter about the size of a small "o" on an ordinary typewriter. Even if the feeding pours through the nipple, as it sometimes does in nurseries, nothing untoward happens if it is removed from the baby's mouth after a bubble or two to give the baby a chance to breathe. The small-holed nipple leads to air swallowing, colic, and vomiting. This simple procedure usually endears the pediatrician to the family for life, since, after many sleepless nights, the parents are greatly relieved to have a quiet, satisfied baby.

The next type of disturbance might be termed "paternal colic." Pediatricians find that much of their practice related to this condition comes in the evenings or weekends. This is partly due to the fact that the father is home at such times, and, wishing to have his share of the new baby, handles the infant more than he should. Another situation causing this type of colic occurs when the father becomes annoyed when his comfort and relaxation are disturbed. The mother then becomes tense, and the baby is quick to sense this reaction. At this point, the father is impatient and sends for the doctor.

This is the period of unexplained evening fussy session, which many babies have from 6 to 10 P.M. In breast-fed babies, one can say that the mother is tired or not producing sufficient food, but it occurs in nonbreast fed babies as well.

Another possibility is that a time of increased activity of the mother during fetal life may have conditioned the baby. Another possibility is the increased tension, activity, and noise in the home when the father and other children are there. This is a condition that has no adequate explanation or cure. The parents should be told that they are fortunate that this period does not occur from 10 P.M. to 2 or 6 A.M.

Tense parents can generate tension in the baby by constantly fussing over him. It is frequently a good therapeutic measure to take the baby out of his environment on the pretext of making tests or trying new feedings. After a few days of rest, parents often settle down and have a perfectly tranquil child.

Overcrowding and housing conditions have led to much so-called colic. When the family live with in-laws or in flats or apartments, fear of disturbing others is cause to pick the baby up when he cries. When put down, he cries again. This is a conditioned situation, which can, of course, be cured by moving to a separate dwelling and allowing the baby to cry it out.

In all of these situations, it is often necessary to give the baby a sedative, such as $\frac{1}{2}$ gr. of phenobarbital and 1/1200 gr. of atropine before meals, for a while. Frequently, the parents need the sedative, but a quiet baby nearly always reacts indirectly on the parents. It has also been observed, in some instances, that when the baby settles down, the mother then becomes worried because he is too quiet. Little can be done with this type of parent.

Colic is also caused by such factors as pins pricking the baby, soiled clothes, too warm or too cold an environment, too much clothing, and so forth.

Feeding disturbances. Feeding is more frequently wrongly blamed for colic than any other cause. Except for quantity, it usually does not cause distress. At the present time, a knowledge of adequate feeding is so universal from medical advice, press periodicals, and advertising by the food companies that it is most unlikely for a baby to receive a feeding which is qualitatively inadequate. Thus, if an artificially fed baby is upset, it is not the feeding that is at fault but the baby. An unusual feeding may be necessary in some instances. It is most important to emphasize these facts to the parents, and this approach may also save the physician some embarrassment. Breast milk also, for practical purposes, causes no qualitative disturbance. Over many years, we have known of only two infants who could not take breast milk in spite of the fact the mothers had large quantities.

Quantitative disturbance is very common, particularly in the breast-fed infant. Underfeeding in these infants is characterized by vomiting, colic, gas, and frequent bowel movements. The gas that is swallowed, plus the hunger, cause the first symptoms, and the frequent movements are a result of passages of intestinal juice from the rectum. The baby does not gain weight. This condition is corrected by increasing the breast milk supply, if possible, by increased stimulation and the use of a supplementary feeding. It is frequently necessary to put the baby on an artificial feeding entirely.

Overfeeding in the breast-fed baby causes a similar set of symptoms: vomiting, colic, gas, and frequent movements. In this situation, the movements are large and the baby usually has had a rapid gain in weight. This condition can be corrected by cutting down the feeding by allowing the baby less time at the breast. Most babies who suffer from this disturbance are large, vigorous, and nurse too rapidly. A small amount of water, $\frac{1}{2}$ to 1 oz., given before feeding time, usually corrects the trouble. It is not wise to try to force the mother to curtail the number of feedings because law of supply and demand nearly always works out a solution in a week or two. If the physician interferes, the mother often cuts down the nursing time too drastically with a result that soon there is no breast milk.

Underfeeding and overfeeding in the artificially-fed infant may produce the same symptoms, but this is very unusual.

Psychoneurotic disturbances. Among the psychoneurotic disturbances are hypertonia and idiopathic colic. Hypertonia is characterized by a crying, high-strung, vomiting baby with all the symptoms of colic. The true hypertonic baby is relieved with atropine, with or without phenobarbital, before feedings.

Idiopathic colic supposedly lasts three to five months and is the disturbance for which a cause cannot be found. This group of infants is fairly small.

Allergy. Food allergy is not an infrequent cause of colic. There may be other symptoms, such as vomiting and/or diarrhea. The cause is difficult to determine and, I feel, frequently overlooked. The condition can be corrected by changing the feeding from cow's milk to goat's milk or to preparations such as soybean suspensions and protein hydrolysates.

Endocrine and metabolic disturbances. In endocrine and metabolic disturbances, feeding difficulties are occasionally seen, some of which have the symptomatology of colic. Tetany is frequently manifested by a very irritable, high-

strung baby. In cases of delayed so-called tetany of the newborn, these may be the only symptoms for some time. In the adrenogenital syndrome, symptoms of colic often occur both in the prerecognized stage and posttreatment phase.

The symptoms of scurvy might be misinterpreted as colic. The baby is irritable and cries, particularly when handled. This condition is due to lack of vitamin C and is increasing. We have

30 to 50 cases a year at The Hospital for Sick Children.

The foregoing are some of the conditions that may give rise to symptoms called colic. One can see that many must be eliminated before it can be said that a child has colic. Many of these conditions are amenable to treatment. It is consequently important to carry out a careful differential diagnosis.

AFTER BACTERIAL MENINGITIS has been successfully treated in infants and children, subdural effusion may be due to excessive withdrawal of cerebrospinal fluid for diagnostic purposes.

In children, 10 to 15 cc. of spinal fluid represents one-fifth to one-third of total fluid volume. Withdrawal of this amount of spinal fluid may cause separation of the dura from the arachnoid, with tearing of the bridging veins in the subdural space and consequent subdural hematoma. When this blood liquefies, osmotic tension draws spinal fluid into the subdural space. Probably, only 1 tap should be done and no more than 3 cc. of fluid removed.

When the fluid withdrawn was limited to 3 cc., only 3 of 27 patients had subdural effusions. In contrast, effusion occurred in 9 of 20 infants from whom larger volumes of fluid were withdrawn.

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PREGNANT WOMEN undergoing valvotomy for correction of mitral stenosis are in no greater danger than those in the nongravid state in whom the operation is performed. Therefore, the procedure should be done if pulmonary congestion or edema persists or recurs despite treatment with salt-free diets, complete bed rest, and mercurial diuretics.

Pulmonary edema is the most important cardiac cause of death in pregnant women. During pregnancy, increased demands are made on the cardiovascular system because of salt and water retention, rise in blood volume, and augmented cardiac output. Healthy women tolerate the demands, but patients with mitral stenosis have considerable rises in left atrial and pulmonary capillary venous pressures.

In 18 pregnant women with mitral stenosis, some of whom were near death, valvotomy was performed with good results; none of the women died or had significant postoperative complications related to the pregnancy. Operation apparently caused premature births in 2 instances, and 1 fetus did not survive.

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An Anesthesiologist's Approach to Prevention of Operating Room Deaths

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NUMEROUS STUDIES¹⁻³ detailing the mortality associated with surgery and anesthesia have appeared. Although valuable, these studies have not provided the practitioner with a regimen which if followed would tend to decrease the incidence of cardiac arrest. An excellent study by Berne and associates⁴ contains an outline of the known causes of cardiac arrest. However, the most fruitful approach is to study isolated instances in which the cause of death is readily ascertainable and preventable in the light of present knowledge and technics and, in turn, to develop from such a study a program for the prevention of operative deaths.

From the time the anesthetist is first asked to assist in the care of a patient until he himself decides that his services are no longer needed, many opportunities arise to apply medical acumen anesthesiologically in the prevention of operating room deaths. The anesthetist must develop a medical routine exactly as every other physician does. Such a routine approach should include the following:

1. Establishment of a physician-patient relationship.
2. An adequate history of anesthesiologically relevant material.
3. Proper evaluation of the physical examination.
4. Pertinent laboratory studies.
5. Preoperative preparation.
6. Extremely close attention to the effects of drugs which are administered with appropriate mechanical and pharmacologic antidotes at hand.
7. Maintenance of the physician-patient relationship until no further care is required.

Should any of these established steps be ignored, unnecessary death will result.

Before elaborating on these phases of patient care, a note on consultation is in order. With

respect to consultation, the agent per se is hardly ever the determinant of whether the patient survives. It is the skill of the administrator rather than the drug he administers that decides the question of life or death. Unfortunately, many surgeons and internists are not aware of this point. The following death illustrates the point.

A 4-year-old boy with known congenital heart disease was scheduled for filling of deciduous teeth. Pentothal administered by skilled anesthesiologists had been used twice uneventfully for diagnostic cardiac studies. The private pediatrician felt that this child could "take" an anesthetic. A technician administered rectal Pentothal, sat the child in a dental chair, and because of restlessness continued with opendrop ether. After one and a half hours in the chair under ether-air, the heart stopped. At autopsy, cor triolucare was found. The administrator and not the agent was to blame in this case.

Let us go back to the medical routine. First is *establishment of a physician-patient relationship*. Eckenhoﬀ⁵ reports 4 deaths in a ten-year period at the University of Pennsylvania which were, in all probability, due to apprehension. The mechanism of death is obscure, but the danger is real. The patient's mental and emotional outlook must be evaluated in advance, and he must be given premedication in such a fashion that he comes to surgery at ease. Patients must be seen as early before operation as possible.

Second is *an adequate history of anesthesiologically relevant material*. This history must usually be taken by the anesthetist because the importance of some of the information, which means life or death to the patient, is unknown to internists, surgeons, obstetricians, and pediatricians. For example, what history ever includes an account of the type of anesthesia a patient has had in the past? Fortunate is the anesthetist who can refer back to previous anesthetic records which, let us hope, were complete and accurately kept, to learn of a patient's sensitivity to premedicants, barbiturates, or depth of anesthesia. Often the patient says that he went into shock after a previous anesthetic or that pulmonary edema developed. This information is vital.

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Eckenhoff⁵ reports the case of a patient who had had severe hypertension during a previous surgical procedure and who died after a second operation. At autopsy, an unexpected pheochromocytoma explained everything.

Another major aspect of the history that must be obtained is a knowledge of the previous medication the patient has taken. The drugs which are important to anesthesiologists are constantly changing as new drugs are introduced or as antidotes to old drugs are found. Until recently, cortisone administration any time within six months before surgery was considered an indication for preoperative medication with cortisone in order to avoid possible postoperative adrenocortical insufficiency. With the development of intravenous hydrocortisone, which acts very rapidly, preoperative cortisone is not necessary unless the postoperative differential diagnosis of adrenocortical insufficiency can be confused with the usual postoperative course, as in craniotomy and thoracotomy. If reserpine has been given any time within ten days previous to administration of an anesthetic, profound hypotension may follow with cardiovascular collapse and, possibly, death. Other drugs of interest are chlorpromazine and promethazine. Both of these drugs interfere with cardiovascular compensatory mechanisms and in overdosage can produce seizures. An uncommon but important problem is that of the patient who has had his pituitary removed in toto for carcinoma or diabetes mellitus and, as a result, diabetes insipidus has developed. Such a patient will be on self-administered Pitressin snuff. It is important to discontinue Pitressin at least five to eight hours before surgery. Thus far, we have had to anesthetize 2 patients in both of whom we were fortunate enough to discontinue the Pitressin in time. The anesthesiologist must obtain and evaluate the preoperative history of drug intake. Of course, cardiovascular, respiratory, and metabolic functions must be fully appraised.

Third is *proper evaluation of the physical examination*. Again, the anesthesiologist is concerned with information which is seldom on the chart, and life may be threatened if it is unavailable. Maintenance of the upper airway is a special responsibility. The following illustrates this point.

A 64-year-old male with a tumor of the nasopharynx was on the operating table for tracheotomy because of progressive dyspnea and cyanosis due to obstruction of the upper airway. To control agitation, the anesthesiologist administered 200 mg. of thiopental. The patient lost consciousness, the airway became completely obstructed, and he expired before the tracheotomy could be accomplished. The error here was administration of a general anesthetic before the airway was secured.

In this part of the evaluation, the major danger of emergency anesthesia must be faced, namely, the full stomach, whether from ingestion of food, hemorrhage, or intestinal obstruction. The most common explainable cause of anesthetic death is vomiting or regurgitation with aspiration and asphyxia. This complication may be managed either by establishing a secure airway with a cuffed endotracheal tube before the induction of general anesthesia or by emptying the stomach before the patient is subjected to general anesthesia. Some recommend a nasogastric tube with a large cuff drawn up against the cardiac sphincter.

In a case of multiple trauma, intracranial injury or thoracic injury may be first diagnosed by the anesthesiologist, especially if the physician in charge of the patient is devoting all of his attention to a different area of the body. If either of these injuries goes unrecognized and an anesthetic is administered, let's say for repair of a fractured lower extremity, the patient may die suddenly on the table. Although the following case is not clear-cut, we feel that death was caused by superimposing the toxic effects of a general anesthesia on a cerebral concussion.

A 32-year-old male received a severe beating about the head while intoxicated. After spending twelve hours at home, he walked to the hospital in a daze. Thirty-six hours after injury, repair of his fractured mandible was scheduled. A nasotracheal tube was passed under local anesthesia, and surgery was begun under Pentothal, nitrous oxide, and oxygen. After one hour of surgery, the heart stopped. The airway had always been perfect, and an overdose of anesthetic agents was not apparent. Autopsy revealed nothing.

The patient's physical state should be inspected carefully immediately before the administration of the anesthetic. Everyone knows of patients who died in the anesthesia induction room while waiting for the anesthesiologist to arrive. A myocardial infarction may occur at any time. The sudden onset of signs of congestive heart failure in the greater or lesser circulations or of a cardiac arrhythmia is cause for delaying the surgery until a diagnosis has been established and the condition has been controlled. The following case illustrates that an anesthetic administered to a patient with recent cardiac arrhythmia caused her death.

Operation in a 65-year-old white female with carcinoma of the rectosigmoid was cancelled because an irregular pulse was noted in the induction room, although previous electrocardiograms had indicated a normal sinus rhythm. Further medical evaluation for three days revealed little, since her rhythm again became regular. Brought up again for surgery, an irregular rhythm was noted and it was decided to go ahead with ether analgesia. After three and one-half hours of surgery, the heart stopped and could not be resuscitated.

Should there be history of asthma or allergy, it is incumbent on the anesthetist to listen to the lungs and to determine the immediate preoperative status of the bronchiolar musculature. At this point, a word on relative and absolute contraindications to anesthesia is in order. We feel there are never contraindications to essential emergency surgery, provided the personnel are competent, anesthesia and surgical equipment are available, and the patient is prepared as completely as possible.

There are absolute contraindications to elective surgery, such as recent myocardial infarction, acute infectious hepatitis, and relative contraindications, such as pulmonary insufficiency. However, again one prepares the patient and balances the risk of anesthesia against the necessity of surgery.

The hemoglobin and the hematocrit are crucial. We all know of the soldiers who died because of rapid administration of Pentothal in the presence of latent or incipient shock. We are all aware in civilian life of the syndrome of chronic shock. In this syndrome, the blood volume is considerably reduced, but the vascular system is correspondingly constricted so that apparent compensation with normal hemoglobin and hematocrit values exists. However, upon the administration of a general anesthetic or of a subarachnoid block, the vasoconstriction is lost and there is a pronounced deficit in the circulating blood volume. Such patients die because of hemorrhagic shock. It is even possible in this situation to set into motion a chain of events which are practically irreversible.

A 40-year-old woman with terminal carcinoma of the breast was scheduled for total removal of the pituitary. Preoperative hemoglobin was 9.1 gm. per cent, and red blood cells were 2.8 million per cubic millimeter. With the induction of general anesthesia, consisting of Pentothal, oxygen, ether, and Arfonad, her respirations became shallow, pulse weak, and blood pressure precipitously fell to a systolic of 60 mm. Hg. All anesthetic agents were discontinued. Five hundred cubic centimeters of whole blood were administered rapidly, and oxygen was flushed repeatedly. In spite of these measures, heart action ceased twenty minutes after all anesthetic agents were discontinued. An irreversible chain of events had been set into motion in this hypovolemic, myelophthitic, pancytopenic patient.

Another major consideration is the temperature. In children, general anesthesia often produces heat retention which, when added to carbon dioxide retention, hypoxia, and to the cerebral irritant effects of the agent itself, may result in convulsions and death. We feel so strongly about fevers in children that elective surgery in a child with a fever is always deferred. We never lower the temperature artificially and then proceed with surgery. In the case of emergency surgery, the temperature is controlled by a water mattress, and the temperature must be lowered before anesthesia is induced.

Fifth is *preoperative preparation*. If the previous four steps are carried out properly, the preoperative preparation becomes a logical outcome. In essence, the object of preoperative preparation is to improve the physical status of the patient to the optimum possible point. We can not cure many conditions, but we can often restore compensation. In the case of dehydration and electrolyte imbalance, we begin hy-

Fig. 1. Bag and mask provide oxygen ventilation. The operator is entering the chest to perform cardiac massage.

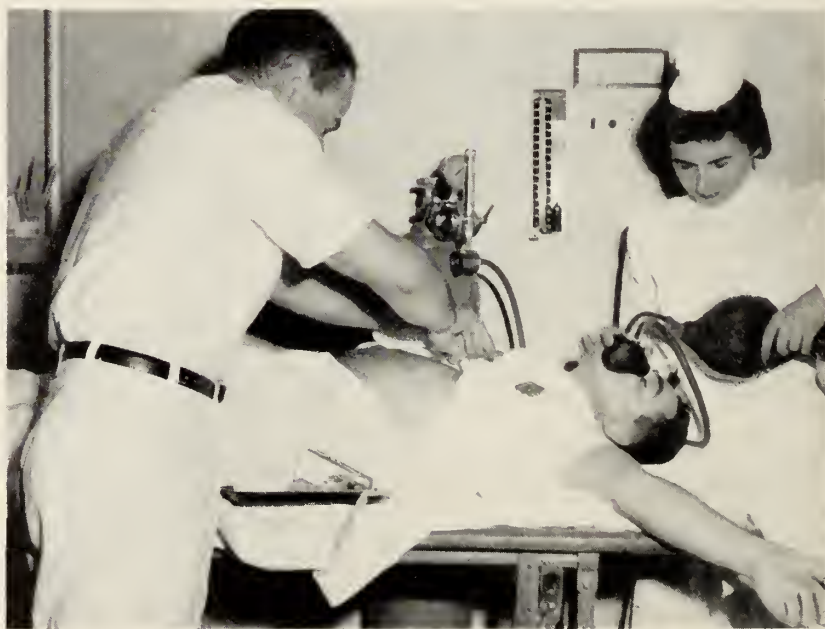




Fig. 2. Mouth-to-mouth ventilation.

drating before surgery. In the case of decreased pulmonary function due to chronic emphysema with superimposed bronchiolar constriction and infection, the infection can be partially cleared up preoperatively and the bronchiolar constriction relieved. The patient in cardiac decompensation can be digitalized. Certainly, in such cases, our role as physicians first and anesthesiologists second becomes readily apparent.

Six, *extremely close attention to the effects of drugs which are administered and appropriate mechanical and pharmacologic antidotes available.* We feel that no anesthesia, local or general, should ever be administered without certain minimum equipment at hand and 2 individuals who are competent to perform resuscitation. Figure 1 illustrates the type of equipment that we feel is necessary. Briefly, it includes a means of administering oxygen under positive pressure and a means of entering the chest to perform cardiac massage if necessary. Note that an endotracheal tube is not necessary. Figure 2 shows that even the oxygen and the mask may not be necessary. Usually, in this group, deaths occur because of a belief that the agent or technic is so safe that no resuscitation whatsoever is ever needed. For example, in New York, a 20-year-old healthy woman expired suddenly after local injection of 8 cc. of 2 per cent procaine for a tonsillectomy. No resuscitative efforts were made. Autopsy was unremarkable. Many procedures are done under local anesthesia with no equipment at hand and without 2 people in attendance who know how to resuscitate. Sooner or later this neglect leads to unnecessary death.

The other major causes of anesthetic deaths are absolute or relative overdose of the anesthetic agent, asphyxia, and reflex cardiac arrest. Always, prevention depends upon the knowledge and skill of the anesthesiologist who administers anesthetic drugs and his close attention to the response of the patient so that an overdose can be avoided, oxygen supplied, and carbon dioxide eliminated.

Last is *maintenance of the physician-patient relationship until no further care by the anesthesiologist is required.*

The anesthetist's responsibility does not cease after the operation. At this time, some problems fall directly into his province. The patient who has had a thoracotomy may have a potential tension pneumothorax. The patient who has had a nephrectomy or adrenalectomy may have a pneumothorax. It is our practice to transport all patients who have had thoracotomies from the operating room to the recovery room under oxygen. The anesthetist must give advice concerning postoperative sedation and analgesics. Failure to do so may result in death from an overdose of morphine. The anesthetist must determine when he can turn the care of the patient over to someone less skilled. This decision may be difficult but should always be conservative. The anesthetist must stay with the patient as long as necessary, even if it means delaying the operating room schedule. Many deaths occur in the postoperative period and, most often, they occur in an unobserved patient. These can be frequently ascribed to asphyxia caused by a poor airway.

In conclusion, I would like to stress the importance of studying very closely every death that occurs in the operating room. In our own community, these studies go on at various levels from the day of death and last indefinitely. First, an autopsy is almost always mandatory before we can with any certainty state the cause of

death. The death should be reviewed at the hospital level by the anesthesiologist in charge and by the surgeon in charge. Ideally, each community should set up an anesthesia mortality committee which would review these deaths on an anonymous but compulsory basis. In this way, we could learn to prevent needless death.

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SKIN GRAFTING procedures can be improved by deferring application of the graft until a satisfactory bed is prepared, by early inspection of the graft, and by use of wet dressings.

Although a fresh surgical wound is the best base for application of a graft, uncontrollable capillary bleeding after the excision of giant nevi, old fibrotic ulcers, burn scars, or large hemangiomas may cause hematoma. Covering the area with sterile pressure dressings for one or two days, during which time antibiotics are given, will create a dry bed. Grafting should be delayed for at least one day after radical mastectomy. If immediate grafting is done, the transplanted skin is sutured to the underlying tissue but not to the adjacent skin flaps, thus preventing the pooling of blood beneath the graft. After operation for parotid tumors or lymphangiomas, two days or more of salivary or lymphatic drainage are also advisable before grafting. After excision of radiation lesions and extensively fibrotic areas, longer delay and daily application of dressings with a coarse mesh gauze base are desirable to foster granulation.

Early inspection of the graft is advisable if complications are suspected. Drainage of underlying blood, serum, or pus and application of pressure will often save the graft. Sometimes, sutures must be removed from one edge of a graft to evacuate a large organized hematoma. Early examination will not dislodge the transplanted skin if ultrafine mesh nylon silk is applied over the grafted area.

When the viability of a graft is in doubt after the first dressing, wet boric acid applications for twenty-four hours are often beneficial. This procedure is not advisable for infants or children with large areas of denuded flesh because of possible toxic absorption.

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Meningococcic Meningitis and Meningococcemia with Probable Waterhouse-Friderichsen Syndrome

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CASE REPORT

A 13-YEAR-OLD WHITE BOY was first seen at Minneapolis General Hospital on August 4, 1957, with the chief complaint of vomiting and headache. Two days prior to admission, he became anorexic and a severe frontal headache developed. The following morning he awoke complaining of chills and spent almost the entire day before admission in bed. His temperature was not taken, but the chills persisted and he became increasingly anorexic. The night prior to admission he slept well but awakened confused and lethargic. His mother noted a rash over his entire body so she took him to the receiving room of a private hospital where he was referred immediately to Minneapolis General Hospital. His past medical history was noncontributory to the present illness. As far as could be ascertained, he had not been in contact with any contagious disease. He had manifested no upper respiratory symptomatology.

Initial examination revealed a well-nourished, well-developed white male who was lethargic and confused. He responded to simple commands and was able to recognize his mother. His temperature was 103.4 rectally, blood pressure was 140/70, respirations were 22, and weight was 51 kg. He had a rash over his entire body—a dark, erythematous, blotchy eruption which blanched on pressure. Few frankly purpuric lesions or petechiae were noted. There was no evidence of trauma about the head. The tympanic membranes were slightly dulled, but there was no definite injection. The pharynx was slightly injected. There were numerous enlarged bilateral anterior cervical nodes. The lungs were clear to percussion and auscultation. Examination of the heart revealed a normal sinus rhythm, no murmurs, and no apparent enlargement. The abdomen was soft and no abnormalities were noted. Neurologic examination revealed a positive Brudzinski sign and a suggestive positive Kernig's sign. All the cranial nerves appeared intact. The gag reflex was present. The fundi did not appear abnormal. The deep tendon reflexes were all present and equal. They appeared to be of normal magnitude. Toe signs were negative.

Between the time of admission and the time of completion of physical examination (about forty minutes), the patient became much more restless and incoherent, and stiffness in his neck and back increased markedly.

KENNETH F. SWAIMAN and RICHARD B. RAILE are associated with the Department of Pediatrics of Minneapolis General Hospital and the Department of Pediatrics of the University of Minnesota.

A lumbar puncture was performed. The fluid obtained was grossly cloudy and the opening pressure was in excess of 600 mm. of water. Examination of the fluid revealed 6,040 white blood cells, 100 per cent of which were polymorphonuclears. The smear showed numerous gram-negative diplococci. Spinal fluid sugar was 28-mg. per cent and the protein was 408-mg. per cent. The hemogram revealed a hemoglobin of 14.7-gm. per cent, white blood cells 25,000 with 93 per cent polymorphonuclears, 5 per cent lymphocytes, and 2 per cent monocytes. Urinalysis was essentially normal. Admission blood sugar was 119-mg. per cent, CO₂ combining power was 23 mEq. per liter, and serum chloride was 99 mEq. per liter. After completion of the spinal tap and prior to the return of laboratory reports, the patient was begun on a regimen which included intravenous fluids; sodium sulfadiazine 200 mg. per kilogram per twenty-four hours, ½ subcutaneously and ½ intravenously initially and then subcutaneously only; and chloramphenicol 100 mg. per kilogram per twenty-four hours.

Within one and one-half hours after admission the patient's blood pressure dropped abruptly to 100/55. His skin became cool, and an alarming pallor developed. His level of consciousness became more depressed. Hydrocortisone sodium succinate 150 mg. was given intravenously. Within an hour, his blood pressure was 120/75. His skin became warm, and the color improved significantly. Curiously, the previously described eruption had disappeared. Upon report of the spinal fluid smear, the patient's treatment was altered to include aqueous crystalline penicillin, and the chloramphenicol therapy was discontinued. Throughout the day, he remained restless and semicomatose. His blood pressure stabilized at 120/70, and the eruption, which had disappeared, reappeared in the afternoon and remained for two to three hours before vanishing permanently. He was given an additional 25 mg. of cortisone intramuscularly later that day. By evening, he was able to take fluids orally. Twenty-four hours after admission, his rectal temperature was normal and, although moderately disoriented and at times hallucinating, he was still able to take fluids orally without difficulty. Except for a transient episode of gross hematuria, his subsequent course was most satisfactory and uneventful. Penicillin and oral sulfonamide therapy was continued for one week. On the second and third days after admission, he was given 25 mg. of cortisone every six hours. Subsequently, this dose was gradually tapered over a ten-day period and discontinued.

Blood cultures taken on admission revealed numerous colonies of gram-negative diplococci, which were characteristic of *Neisseria meningitidis*. We feel that this was

a case of meningococcal meningitis as well as meningococcemia with probable early Waterhouse-Friderichsen syndrome.

DISCUSSION

History. As late as 1938, it was candidly stated that meningococcemia with the Waterhouse-Friderichsen syndrome was 100 per cent fatal and usually so within twenty-four hours.¹ In 1940, with use of the sulfonamides,² adrenal cortical extract, and antimeningococcal serum, the first cure of this syndrome was reported. During the next 10 years, numerous attempts at therapy incorporating use of adrenal cortical extract and, later, desoxycorticosterone with sulfonamide and penicillin were reported.³⁻⁶ Objective study of the results of this type of steroid therapy left a great deal of doubt as to the value of the steroids in therapy of the Waterhouse-Friderichsen syndrome. In June 1950, a patient who had previously been given penicillin, sulfonamides, and adrenal cortical extract and who appeared definitely moribund was given cortisone. He abruptly improved and lived.⁷ This was the first reported use of cortisone in the treatment of this syndrome. Within six months, at least 2 other cases^{8,9} were reported in the literature with encouraging results. Since that time, numerous case reports¹⁰⁻¹³ have established that the use of cortisone, hydrocortisone, and some of the newer "meta" steroids are important additions to the therapy of the Waterhouse-Friderichsen syndrome. In the case presented, intravenous rapid acting hydrocortisone sodium succinate was used initially with prompt and striking effect.

PATHOLOGY

It was thought for many years that gross, frank, bilateral, adrenal hemorrhage causing acute adre-

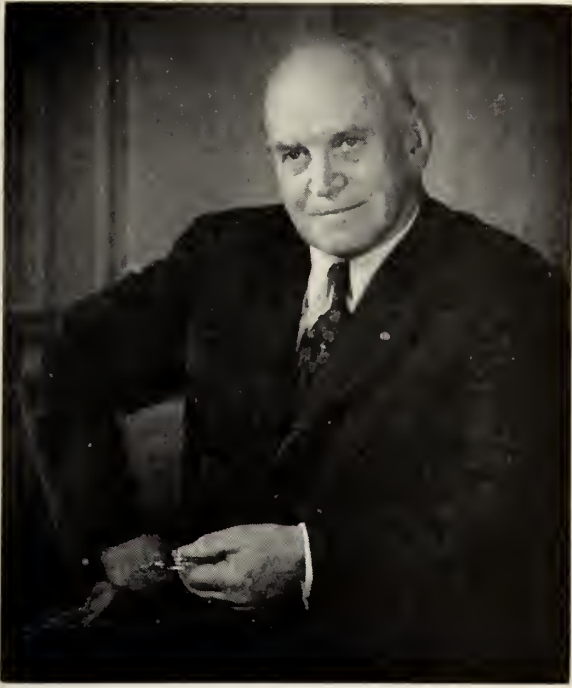
nal insufficiency was the etiology of the Waterhouse-Friderichsen syndrome. This theory was based on vascular damage secondary to a fulminating septicemia. In the early 1940's, several papers revealed numerous cases of the clinical, classical Waterhouse-Friderichsen syndrome which did not have the expected bilateral adrenal hemorrhages.^{14,15} However, careful pathologic studies revealed that the hemorrhages merely represented the extreme late stages of adrenal destruction, and, thus, when hemorrhage was present, the primary pathologic picture was obscured. These studies revealed that there was degeneration of the cell cords of the zona fasciculata and neighboring adrenal cortical cells.¹⁶ When parenchymal destruction had taken place, the highly vascular adrenal gland was engulfed by hemorrhage as the perivascular structures were destroyed. Experimental work has demonstrated that this picture is not incompatible with extreme stress, such as would be experienced during fulminating septicemia.^{17,18} Similar adrenal changes have been produced experimentally as a "side reaction" in studies of the localized Shwartzman phenomenon.¹⁹ Microscopic studies of the skin lesions have shown that they are secondary to vascular dilatation and capillary damage.

SUMMARY

A 13-year-old boy with meningococcal meningitis and meningococcal septicemia with probable early Waterhouse-Friderichsen syndrome was successfully treated by use of hydrocortisone, sulfonamides, and penicillin. The evolution of the present therapeutic program is discussed as well as some physiopathologic concepts of this disease.

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Will E. Donahoe, M.D.

Physician, Educator, and Humanitarian

By J. ARTHUR MYERS, M.D.

FOR MORE THAN a third of a century, no meeting of pediatricists or public health workers, either local or national, has been complete without Will Donahoe's presence. It has not been just from his participation in formal programs but from personal conversations with him in hotel rooms and lobbies, in assembly halls immediately before and after meetings, during breaks to visit exhibits, and so forth, that so many physicians have learned so much from him.

Aside from periods of schooling at St. Thomas College, St. Paul, and the University of Illinois, his entire life has been lived in Sioux Falls, South Dakota, where he was born May 18, 1886, when that area was still Dakota Territory. After completing an internship, he entered general practice in Sioux Falls in 1913. There he saw the almost unlimited possibilities of increasing human longevity through treatment and prevention of diseases which were incapacitating, maiming, and crippling large numbers of children. He also saw the opportunity afforded him of informing parents and the public in general of methods by which children could be protected against many of the conditions that were destroying them. Therefore, he decided to devote the remainder of his professional life to that cause. In 1919, he went to the University of Iowa for post-graduate work in pediatrics. He then spent five months divided between clinics and ward rounds under Doctors Abt and Brenneman in Chicago and Doctor Sedgewick of the University of Minnesota, before returning to Sioux Falls where he has since confined his practice to pediatrics and public health.

Much of the time that could be snatched from the demands made upon him in practice was devoted to reading the best medical journals and books in his field. This, together with attendance at conventions, kept him abreast of the latest developments and far ahead of most physicians.

He realized that the best time to transmit information concerning health was when persons were personally interested. Therefore, he has devoted a great deal of time to individual patients and their families, which inspired their confidence in him.

He has always enjoyed community endearment as he was ever ready to devote whatever time and energy any community health problem required. For example, in 1920, he introduced into the area he served the first immunization program against diphtheria. The same year he established the first public clinic in the state for ill and well children and served as school physician from 1920 to 1936—for 11 years without compensation.

Beginning in 1925 and continuing until 1936, he was the health officer of Sioux Falls on a part-time basis. Since this office was the official health agency, a magnificent opportunity was provided to make recommendations, to introduce new procedures, and to support others already being utilized. In fact, during this period, Doctor Donahoe contributed significantly to the entire state program, not only among physicians but also with other groups, including educators and the public. Better sanitation laws were enacted pertaining to such items as dairy products. He supported the veterinarians in their campaign to eradicate tuberculosis from the cattle herds.

He instituted tuberculin testing of school children.

As he retired from the health officership of Sioux Falls, he became superintendent of the Board of Health of his entire (Minnehaha) county. He personally checked for three successive years the 100 rural schools of the county. This had never been done, and the sanitary conditions and physical facilities were most deplorable. More than 60 per cent of the drinking water was proved unsafe. Corrections were obtained during this period in practically every instance. During these three years, the children were tuberculin tested and examined and referred to their own physicians for immunizations and corrections. The promised payment by the county commissioners was denied and the services, therefore, were discontinued. Recent survey of the schools by the press showed that they had again dropped to their former state.

He led the way in the organization of the South Dakota State Health Officer's Association. While president of this organization, he combined it with the Tuberculosis Society under the name South Dakota Health and Tuberculosis Association.

He formulated the idea of greater political and economic strength in a union of the inter-allied groups in South Dakota in 1933. This brought all 6 groups together in Sioux Falls in 1936 for their annual meetings and general sessions. Some 1,100 persons attended the closing banquet. This was the first group of so many inter-allied bodies in the country. Communications were received from the New York Society, and official representations attended from Illinois and Iowa State Medical Associations.

He has been a prominent worker with the Red Cross and the Salvation Army, having served on their boards. At present, he is a member of the Executive Board of the Volunteers of America.

The year after he entered general practice, he organized the first Boy Scout troop in Sioux Falls. His interest in this organization has continued throughout the years and, in 1938, he received the Silver Beaver award of the Boy Scouts of America.

During World War I, he served in the United States Medical Corps and was Commander of the United States Public Health Service of Armed Forces Reserve from 1944 to 1954. He is a charter member of the American Legion.

Doctor Donahoe is a member of the Sioux Falls Chamber of Commerce, Rotary, Elks, Walton League, and the Minnehaha Country Club. He is past State Master of the Fourth Degree Knights of Columbus.

His popularity among physicians is evidenced by his election to three successive terms as president of the Seventh District Medical Society in 1928, 1929, and 1930. He served on the council of the State Medical Association from 1930 until he retired as chairman in 1945.

He has long been a member of the active staff of the Sioux Valley and McKennan hospitals, as well as attending physician to the South Dakota State Children's Home, Presentation Home, and Lutheran Home House of Mercy. He organized the Guild of Catholic physicians and has since been its president.

Nationally and internationally he is a fellow of the American Medical Association, a diplomate of the American Board of Pediatrics, a fellow in the Academy of Pediatrics, a fellow in the Academy of Internal Medicine, as well as past fellow of the American Association of School Physicians and the American Public Health Association.

He has long been active in the Northwestern Pediatric Society and the Sioux Valley Medical Society, which he has served as president.

He is co-chairman of the Inter-Hospital Committee in Sioux Falls, Community Physicians Disaster Committee, and chairman of the American Academy of Pediatrics.

It is difficult to comprehend how one physician could in a lifetime serve so many so well and in so many ways. In leading and directing these activities, Doctor Donahoe has exhibited unusual ability in avoiding jealousy and enmity, which so long ago caused it truly to be said that "The prophet is not without honor save in his own country." In 1952, the Cosmopolitan and Civic Clubs of Sioux Falls conferred upon him the Distinguished Community Service Award based on the theme of *charity and children*.

In 1957, the South Dakota State Medical Association conferred upon him its Distinguished Service Award for *practice of medicine and promotion of public health*.*

In addition to the large volume of informal teaching done throughout his professional career of 47 years, he is also clinical professor of pediatrics at the Medical School of the University of South Dakota.

This sketch, which should be expanded to a large volume, must not close without an expression of personal appreciation. Over a long period of years, he has been a true friend. Our meetings at various national conventions, as well as in South Dakota and Minnesota have, without exception, been most helpful and inspiring. His kindly spirit, his calm and considered judgment, lack of selfishness, his great store of knowledge, his numerous accomplishments, and his goodness in every way have made each of our many associations most pleasant and profitable. His life is one to be emulated by all who strive to become truly great American citizens.

*This citation was published in full in the July issue of the *South Dakota Journal of Medicine and Pharmacy*. With consent of the editor, I have drawn freely from this citation. The South Dakota State Medical Association kindly provided the photograph.

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Progress in Radiobiology. Proceedings of the fourth international Conference on Radiobiology held in Cambridge, August 14 to 17, 1955. Edited by JOSEPH S. MITCHELL, BARBARA E. HOLMES, and CYRIL L. SMITH, 1956. Springfield, Illinois: Charles C Thomas, 557 pages. \$12.75.

A great variety of research topics and interesting discussions by delegates are presented in this book. These factors, together with the available bibliographies, provide the reader with an excellent reference work in radiobiology. This account is of particular value to the investigator working in America because of the wealth of information coming from research laboratories in other countries.

This account of current trends in radiobiologic research emphasizes the importance of fundamental research on the effects of ionizing radiations on biologic systems as a basis for improved clinical applications. Furthermore, it serves to point out the need for investigators trained in various disciplines in order to carry out an effective research program encompassing the many facets of radiobiology.

M. K. LOKEN, Ph.D.

The Merck Manual of Diagnosis and Therapy, ed. 9. Editorial board: CHARLES E. LYCH, M.D., editor; WILLIAM P. BOGER, M.D.; GEORGE A. CARDEN, M.D.; AUGUST GIBSON, M.D.; and DICKINSON W. RICHARDS, M.D., 1957. Rahway, New Jersey: Merck & Co., Inc., 1,870 pages, illustrated. Cloth \$6.75, deluxe \$9.00.

This popular and comprehensive book has been thoroughly revised, and many portions have been completely rewritten. Additional excellent and extremely useful plates have been included, which, for example, illustrate the technique of intrarticular injection, tracheotomy, lumbar puncture, and gastrointestinal suction siphonage procedures. Contributing to its value are hundreds of prescriptions, 63 tables, and special sections devoted to the enhancement of medical diagnosis and treatment. The index has been considerably expanded and more liberally cross-referenced than before.

Although this edition contains over 300 pages more than the last, the use of extra thin paper has preserved the handy format of the book.

The Merck Manual continues to



be an outstandingly accurate and up-to-date reference book, giving practical assistance to all those engaged in the practice of medicine and in the allied professions.

J. A. MYERS, M.D.

Physiopathology of the Reticulo-Endothelial System, edited under direction of B. N. HALPERN, 1957. Springfield, Illinois: Charles C Thomas, \$9.00.

Seventeen authoritative articles on the reticulo-endothelial system and/or related problems constitute the contents of this volume, which summarizes the proceedings of a symposium organized by the Council for International Organizations of Medical Sciences and the Unitarian Service Committee under the able direction of B. N. Halpern of Paris.

It is well over four decades ago since Aschoff crystallized the concept of the RES on the basis of studies with colloidal suspensions of vital dyes. Since his pioneering work, the readily identifiable property of phagocytosis is known to be related to the cells derived from the diffuse reticulum and the lining vascular epithelium of connective tissues (the RES). These phagocytic cells are now regarded as a third systemic line of defense, which comes into play over and above the first two defenses, namely, those at the site of entry of an invader and those at the site of the regional lymph nodes. In addition to phagocytic functions, certain metabolic and humoral defense functions are also related to the RES. These cells are able to absorb chylomicra formed by lipids and exogenous cholesterol and participate in iron metabolism by storing it or by controlling its exchanges with humoral factors of iron transport. The more important known roles of the RES concern, however, the handling of toxins and particularly endotoxins, but opinions are still divided on the exact mechanisms and role of this defense function of the RES. The title of the book is, perhaps, misleading; patho-

physiologic aspects of the RES rather than physiopathologic considerations are in the foreground. This may be more than only a matter of semantics, since it is the physiology of the RES which will call for considerable additional work in the future. The status quo of our knowledge in this field is hardly surprising. The RES originated as a concept primarily from morphologic considerations. It has gained increasing importance from contributions in many other fields ranging from physical chemistry to bacteriology and immunology. The methodology available for physiologic studies on the RES is discussed in detail in this volume, which is recommended primarily to investigators in the basic and applied medical sciences.

FRANZ HALBERG, M.D.

Lupus Nephritis, by ROBERT C. MUEHRCKE, ROBERT M. KARK, CONRAD L. PIRANI, and VICTOR E. POLLACK, 1957. Baltimore: Williams & Wilkins Co., 133 pages, 13 pages of references, 11 chapters. \$3.00.

This book is a classical, detailed, clinical, and pathologic study of lupus nephritis based on renal biopsies. The authors' experiences with 33 patients provide the background. The diagnosis, prognosis, and treatment are vividly discussed. The illustrations of the histologic changes are excellent. The literature is extensively reviewed. The text is very well written, and there is a minimum of typographical errors. The bibliography is comprehensive. The paper is of excellent quality. This text would be a valuable addition to the library of any physician.

M. P. REISER, M.D.

The Recurrent Laryngeal Nerves in Thyroid Surgery, by WILLIAM H. RUSTAD, M.D., 1956. Springfield, Illinois: Charles C Thomas, \$4.50.

This is an excellent anatomic study of the recurrent laryngeal nerves, which presents a practical application to the thyroid surgeon. The author's purpose is to call attention to the recent recognition that many of the postoperative derangements of laryngeal function are due to damage of the branches of the recurrent laryngeal nerve, hitherto generally regarded as a single nerve.

The anatomy of the larynx is accurately reviewed because the right and left recurrent laryngeal nerve

(Continued on page 24A)



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BOOK REVIEWS

(Continued from page 22A)

supplies all the muscles of the larynx except the cricothyroid. The cricothyroid muscle receives its innervation from the external branch of the superior laryngeal nerve. The author's investigations have established that the recurrent laryngeal nerve frequently divides into two branches, less often into four to six branches, all entering the larynx.

In making a clinical application of these facts, the author states that "the recurrent laryngeal nerve, whether as a main single trunk or whether broken up into a variable number of component branches, has been seen to enter into many diverse and completely unpredictable branching patterns." He further states that there are no constant differences in the relationship between the inferior thyroid artery and the recurrent nerve on the right and left side. The author from his study, embryologically states emphatically that it is impossible for the recurrent laryngeal nerve to enter the thyroid gland parenchyma. He further concludes that "because of the branching of the nerve, it is not practical, where the primary mission of the operation is to remove the gland, to isolate the recurrent nerve completely, since the operator may

be deceived by dissecting out only one branch." In a further clinical suggestion, he recommends the application of ligatures to the inferior thyroid artery lateral to the tracheoesophageal groove to avoid injury to the nerve. Pre- and postoperative laryngoscopy are urged. Numerous excellent illustrations of the anatomy of the recurrent laryngeal nerves are presented.

This book should be in the possession of every surgeon engaged in thyroid surgery.

MARTIN NORDLAND, M.D.

Hypertension, by IRVINE H. PAGE, M.D., ed. 2, 1956. Springfield, Illinois: Charles C Thomas. \$3.00.

This manual on hypertension, written for patients, for them amounts to a textbook of sound information. An outstanding student of and authority on hypertension discusses the subject and explains what it is, why the physician has performed the various examinations, and what can be done about the condition. While the best transfer of information to the patient is given by the physician who has personally examined him at not infrequent intervals, the patient's access to such a book will supplement his physician's viewpoint. This manual may well indeed be recommend-

ed for the inquisitive and curious person. The paragraphs on Cultivation of the Soul may profitably be read by physician and patient alike.

C. A. McKINLAY, M.D.

Natural Childbirth, by H. B. Atlee, M.D., 1956. Springfield, Illinois: Charles C Thomas, 79 pages. \$2.75.

This is a small volume as are the others of the American Lecture series. The author presents his own concepts of a philosophic approach to pregnancy and, particularly, to labor. He describes his own technic for natural childbirth together with the organization of the prenatal teaching classes and their content. There is a chapter dealing with the physical arrangement of a lying-in unit for use in this sort of an approach to labor.

It is a short presentation but contains a great deal of what appeals to the reviewer as the wisdom of careful observation and long experience. Some of his conclusions are stated in pungent terms which will remain in the mind of the reader. One could hope that everyone doing obstetrics would read the essay and ponder over it.

JOHN L. McKELVEY, M.D.

News Briefs . . .

North Dakota

THE NEW CLINIC at Northwood, North Dakota, is now completed. An addition to the Northwood Deaconess Hospital, the building is of modern design and well equipped to meet a wide range of medical and surgical needs.

DR. L. G. PRAY of Fargo has been elected president of the First District Medical Society. Other officers are: Dr. A. L. Klein, Fargo, vice president; and Dr. Frank M. Melton, Fargo, secretary-treasurer. Delegates to the North Dakota State Medical Society are: Dr. Arthur C. Burt, Dr. Frank M. Melton, Dr. W. L. Macaulay, Dr. F. A. DeCesare, Dr. John S. Gillam, all of Fargo; and Dr. E. J. Beithon, Wahpeton. Alternates are: Dr. D. G. Jaehning, Wahpeton; Dr. L. E. Wold, Dr. J. F. Houghton, Dr. J. F. Schneider, Dr. B. F. Amidon, and Dr. Henry A. Norum, all of Fargo. Dr. Earl M. Haugrud, Fargo, was elected censor.

DR. PHILLIP O. DAHL has been elected president of the medical staff at St. Alexius Hospital in Bismarck. He succeeds Dr. P. Roy Gregware, who will continue to serve on the executive committee of the staff in his capacity as past president. Other officers elected to serve

during 1958 include: Dr. Paul L. Johnson, president-elect; Dr. Olav V. Lindelow, secretary; and Dr. Robert W. Henderson, member-at-large.

DR. RALPH D. WEIBLE, who has been with the Dakota Clinic in Fargo since 1940, except for four years with the Army Medical Corps during World War II, has been elected president of the St. John's Hospital staff. Other new officers are: Dr. Lee A. Christoferson, vice president, and Dr. Richard J. Zauner, secretary-treasurer. New members of the advisory board are Dr. Zauner and Dr. J. F. Schneider. Holdover members are Dr. W. B. Armstrong and Dr. O. A. Sedlak.

DR. CLARENCE DAVIS, JR., a Watford City physician, has been appointed district deputy health officer for McKenzie County.

DR. ROBERT IVERS, who recently completed his internship and residency at St. Luke's Hospital, Fargo, has been granted a fellowship in neurology at the Mayo Clinic. Dr. Ivers left for Rochester on December 27.

DR. GILBERT J. GUSCOTT and DR. JOHN L. MAGNESS, both natives of Ohio, have become associated with the Dakota Clinic in Fargo. Dr. Guscott is head of the Department of Physical Therapy, and Dr. Magness is in the Department of Internal Medicine.

(Continued on page 26A)

Surgery in Heart Disease

JOHN FRANCIS BRIGGS, M.D.

St. Paul, Minnesota

SURGEONS have become important members of the team in the diagnosis and treatment of heart disease. As a result of their efforts, great contributions to cardiology have been made and many new treatments have been devised, which augment the medical care of the patient suffering from heart disease. Some surgical procedures are curative and others palliative. The following cardiovascular diseases may be benefited by surgery:

THE AORTA

Patent ductus arteriosus is essentially an arteriovenous fistula. A machinery-hum murmur heard over the pulmonary artery area to the left of the sternum establishes the diagnosis. In addition, there is a wide pulse pressure and usually a characteristic x-ray picture. The electrocardiogram is of no value in a patent ductus arteriosus. Treatment is surgical.

The "*aorticopulmonary window*" syndrome. The physical findings are the same as those in a patent ductus, but the machinery-hum murmur may be heard only at the lower end of the sternum. Many times the diagnosis is not established until surgical exploration is carried out. The surgeon attempts to find a patent ductus and, not finding it, discovers the communication between the aorta and the pulmonary artery. An-

giograms may be of value in the diagnosis. Surgery, when possible, is curative.

Coarctation of the aorta is diagnosed by finding hypertension in the upper extremity and hypotension in the lower extremity. The physical findings are negligible, but a systolic murmur may be heard over the aortic area, and, when the lesion is associated with a bicuspid aortic valve, a diastolic murmur may also be present. The diagnosis can be made clinically by feeling the radial artery while, at the same time, palpating the femoral artery. In coarctation of the aorta, the femoral pulsations are diminished or absent. The x-ray film is often of no value, but scalloping of the ribs may be present. The electrocardiogram may be normal or show a left-axis deviation. Angiograms may indicate the degree of stricture as well as the location of the stricture in the aorta. Surgery is curative.

Arteriovenous fistulae, both congenital and acquired, can be cured by surgery. Thrombosis of the aorta is amenable to surgery as are arterial embolic phenomena.

Abnormalities of the vascular rings may produce either dysphasia or stridulous respiration. The diagnosis should be suspected in any newborn who has difficulty in swallowing or who has a stridulous type of respiration. Once the diagnosis is established, the treatment consists of ligation and severance of the offending blood vessel.

Aneurysms of the aorta may be congenital or acquired. Previously, almost all acquired aneurysms were lumatic in origin, but today they represent an arteriosclerotic process. The diagnosis

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may be made accidentally by finding the pulsating mass on physical examination or by seeing a mass on the x-ray film or by fluoroscopy. Occasionally, the first knowledge of the existence of the aneurysm occurs as the result of a vascular crisis after rupture or dissection of the aneurysm. The shock picture, drop in blood pressure, and the altered pulsation of the affected blood vessels make the diagnosis easy. Operation is indicated as an emergency procedure. It is my opinion that all patients with aneurysm of the aorta should undergo surgical treatment if feasible.

HEART

In a review of the lesions that may be amenable to surgical treatment, we shall start with those that are within the heart itself.

Septal defects. Atrial septal defects are not uncommon. The diagnosis may be suspected because of the gracile habitus of the patient. Cyanosis and/or clubbing may or may not be present. There is usually a systolic murmur over the base of the heart, and there may be an associated diastolic murmur. The roentgenogram is rather characteristic in that it shows an enlargement in the conus area with dancing pulmonary blood vessels on fluoroscopy. The electrocardiogram may be normal or reveal a right-axis deviation. Cardiac catheterization as well as angiocardiology are of value in the diagnosis and management of these patients. I believe that surgery is indicated in all of these cases.

Ventricular septal defects may vary in size from minute openings to complete absence of the ventricular wall. The physical findings reveal a loud blowing systolic murmur over the middle of the sternum opposite the third and fourth interspaces. In addition, a systolic thrill is found. The heart may be normal in size. Roentgenograms are of no importance in diagnosis, and the electrocardiogram is seldom an aid in this respect. Cardiac catheterization and angiocardiology, as well as other laboratory procedures, are of great value in both the diagnosis and in planning treatment. I believe that these patients do not require surgical treatment unless there is evidence of cardiac embarrassment.

A septal defect can occur by a perforation of the septum complicating acute myocardial infarction. The symptoms are sudden, severe heart failure complicating the course of the myocardial infarction. The signs are the same as in the congenital defect. Surgery should be attempted.

Tetralogy of Fallot. In this condition, there is pulmonary stenosis with an interventricular septal defect, various degrees of transposition of the great vessels, and enlargement of the right side

of the heart. These patients are the classical "blue baby" individuals. Cyanosis is outstanding, and the fingers and toes are usually clubbed. A blowing systolic murmur is heard over the pulmonary area. The roentgenogram shows enlargement of the right heart, which is verified by the fluoroscopic examination. The electrocardiogram reveals a right-axis deviation with or without strain. In such cases, cardiac catheterization and angiocardiology may be of great value in assisting in the diagnosis. Surgery is always indicated in these patients.

Anomalous venous return is a condition in which the venous return to the right side of the heart is abnormal. When recognized, surgery should be attempted.

Valvular defects—the aortic valve. Aortic stenosis may be congenital or acquired. If congenital, it may be valvular in origin or a subaortic stenosis. In subaortic stenosis, a membrane partially closes off the lumen of the aorta. Acquired stenosis is almost always rheumatic in origin, and, in later life, the lesion becomes calcified, producing the calcific nodular valve defect. A systolic murmur is heard over the aortic area, which is transmitted into the vessels of the neck and apex. Occasionally, a diastolic murmur may be present. The blood pressure varies, but seldom is the diastolic pressure below normal. A systolic thrill may be present, and the second sound may be decreased or absent. The roentgenogram shows enlargement of the left side of the heart, and calcification may be demonstrated in the aortic valve. The fluoroscopic examination adds little to the film studies. The electrocardiogram shows left-axis deviation with or without left heart strain. I feel that the present treatment of aortic stenosis is such that surgery is not indicated unless the patient has (1) signs of heart failure, (2) attacks of syncope, or (3) anginal seizures. The surgical treatment of the congenital defect, I believe, is indicated.

Aortic insufficiency. At one time, aortic insufficiency was almost always luetic in origin, but today it is almost always rheumatic. The diagnosis is made by finding a diastolic murmur in the aortic area. The diastolic blood pressure drops, and a wide pulse pressure is present. X-ray examination reveals an enlargement of the left side of the heart. Fluoroscopic examination adds little. The electrocardiogram reveals left-axis deviation with or without left heart strain. Surgery in these patients is indicated when there is (1) congestive heart failure, (2) attacks of syncope, and (3) anginal seizures. The introduction of a plastic valve decreases the degree of regurgitation and benefits the patient.

The pulmonary valve — pulmonary stenosis. Pulmonary stenosis is essentially a congenital defect. It may be valvular or infundibular in type. A blowing systolic murmur is heard over the pulmonary area, which is frequently associated with a systolic thrill. The second pulmonic sound may be diminished or absent. The chest x-ray reveals an absence or decrease in the size of the conus area. Fluoroscopic examination reveals not only a decrease in this area but a decrease in vascularization of the lungs. The electrocardiogram usually shows a right-axis deviation with or without right heart strain. This defect may be isolated or found in association with other congenital defects. Cardiac catheterization and angiocardiology are invaluable in the diagnosis and treatment of this condition. I believe that all of these patients should undergo surgery.

Mitral stenosis. Mitral stenosis may be congenital in origin, but the greatest number of cases are due to rheumatic fever. The problem in diagnosis is to be certain that it is a "tight mitral stenosis." I believe that the diagnosis of a "tight mitral valve" can be made clinically. The following criteria are necessary to establish the diagnosis:

1. The presence of either a presystolic or a mid-diastolic murmur at the apex. A harsh murmur late in systole may also indicate a "tight mitral valve."

2. The first sound should be accentuated, the second pulmonic sound should be duplicated, and/or a diastolic murmur should be heard over the pulmonic area.

3. The heart should be normal in size, and this can be confirmed by fluoroscopic x-ray examination. In addition, the esophogram should be positive. The electrocardiogram should reveal a right-axis deviation with or without right heart strain.

Opinion differs as to when surgery is indicated in the treatment of the mitral valve defect. Obviously, the treatment is directed toward relieving the pulmonary hypertension. I feel that surgery is not indicated in mitral stenosis unless there is (1) clinical evidence of pulmonary hypertension, and/or (2) if medical treatment fails to control the cardiac difficulty. Surgery is always indicated in embolization. We must remember that a commissurotomy may be only temporary, and the patient may again come to surgery at a later date should the valve re-stenose. Surgery in mitral heart disease is contraindicated when the mitral insufficiency is the predominant lesion. This may be diagnosed by finding a loud systolic murmur at the apex. The

second pulmonic sound is not accentuated. The left ventricle is enlarged clinically. The roentgenogram reveals enlargement of the left ventricle, and this can be confirmed by fluoroscopic examination. An electrocardiogram shows left-axis deviation with or without left heart strain. The presence of active rheumatic carditis, sub-acute bacterial endocarditis, or other significant cardiac lesions also contraindicate surgical intervention.

Mitral insufficiency may be diagnosed as outlined previously. The value of surgical treatment is questionable.

Tricuspid stenosis is usually congenital in origin and suggests the tetralogy of Fallot syndrome with the exception of the fact that the electrocardiogram usually shows a left-axis deviation with left heart strain in contradistinction to the right-axis deviation with heart strain. In these cases, surgery should be attempted.

Coronary artery disease. A number of methods have been suggested for the surgical treatment of this condition. Attempts to relieve the pain have been made by paravertebral injections of alcohol, Novocain, and the like. Cervical sympathectomy has been suggested. Although these procedures may alter the degree of pain, they, in turn, however, are not without danger and are not recommended. Direct attempts to revascularize the heart have been many. It could serve no purpose to list all these methods, for it is my opinion that, at this time, no surgical procedure is of value in the treatment of coronary heart disease.

The Pericardium. Acute pericarditis may be associated with the rapid accumulation of fluid in the pericardial sac, producing a cardiac tamponade. Depending upon the etiology of the pericarditis, the fluid may be serous, purulent, or a combination of both. As a result of the rapid accumulation of fluid, the cardiac output is decreased. There is a decrease in venous return to the heart. The venous pressure rises rapidly, and the pulse becomes weak. Physical examination reveals that the jugular veins are greatly distended, the heart is silent, and the cardiac dullness is increased. The electrocardiogram may show changes of pericarditis. The roentgenogram shows a rather typical pear-shaped type of heart, and fluoroscopic examination usually reveals absence of demonstrable pulsations. The removal of fluid is imperative. It may be removed by puncture or by surgical drainage. Treatment should then be directed toward the cause of the pericarditis.

Chronic constrictive pericarditis. In this condition, the heart is encased in a fibrous mass.

The insidious onset of the disease makes diagnosis difficult. The patient is suggestive of an individual with cirrhosis of the liver with the exception that there is a pronounced increase in the venous pressure. The physical findings are those of an individual with congestive heart failure, and the veins in the neck are markedly distended. The heart is silent and usually small and fixed in position. The x-ray examination reveals the small heart, and, occasionally, calcification may be seen in the pericardium. The fluoroscopic examination and kymographic examination emphasize the decreased pulsations. Cardiac catheterization often is of value because a characteristic pressure curve may be present. The electrocardiogram may suggest the diagnosis because of the altered ST and T segments as well as low voltage. Once the diagnosis is made, surgery is indicated.

The heart may be injured by direct or indirect trauma to the chest wall. One should always be alert to the possibility of a laceration of the heart, hemopericardium, or laceration of a valve. Surgery should be immediate if indicated.

Tumors of the heart should be removed when possible.

CONCLUSION

Many surgical procedures are available which are of benefit to the cardiac patient. These procedures may be curative in some instances and palliative in others. We must always be alert to the benefits that may result from surgical intervention. It is suggested that in the treatment of heart disease, we must consider in each case whether the patient is one in whom surgery can complement or supplement our medical treatment.

CHOLESTEROSIS of the gallbladder is caused by an aberration in cholesterol metabolism. Lipoid material is most abundant in the villi of the mucosa but may also be found in other layers of the gallbladder.

Abdominal pain, the most prominent symptom, may be localized in the right upper quadrant, the periumbilical region, or the epigastrium and is referred to the back or shoulder in about half of patients. Other symptoms include gaseous cructation, flatulence, nausea, vomiting, and intolerance to fried and fatty food. Women are more frequently affected than men.

Cholecystitis is sometimes associated with cholesterosis; however, the latter condition may cause symptoms without inflammation of the gallbladder.

Because cholesterosis does not produce fibrosis or impair concentration and emptying, roentgenographic examination shows no abnormality in about one-half of patients. When cholecystograms are normal but symptoms are characteristic of gallbladder disease, duodenal drainage should be done. If microscopic study shows cholesterol crystals in the B bile so obtained, the patient has cholesterosis.

Removal of the diseased gallbladder will usually relieve symptoms. However, cholecystectomy should not be performed if the diagnosis cannot be definitely established.

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Acute Nonspecific Pericarditis

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ACUTE FIBRINOUS PERICARDITIS is an inflammation of the pericardium associated with the formation of a fibrinous exudate on the pericardial surfaces. The inflammatory process may subside or progress and may be complicated by a serous, serosanguineous, or purulent exudate.

Acute pericarditis may be classified into the following groups:

1. Acute nonspecific pericarditis.
2. Infectious pericarditis.
 - a. Pyogenic pericarditis.
 - b. Tuberculous pericarditis.
 - c. Mycotic pericarditis.
 - d. Parasitic pericarditis.
3. Pericarditis occurring as a manifestation of the "collagen diseases."
 - a. Rheumatic pericarditis.
 - b. Pericarditis accompanying rheumatoid arthritis.
 - c. Pericarditis of disseminated lupus erythematosus.
 - d. Pericarditis occurring in periarteritis nodosa.
4. Uremic pericarditis.
5. Pericarditis secondary to myocardial infarction.
6. Pericarditis due to neoplasm.
7. Traumatic pericarditis.
8. Rare forms of pericarditis of uncertain etiology.¹

This paper will deal with acute nonspecific pericarditis, which is the collective name for cases of acute pericarditis in which no systemic or local causal agent can be demonstrated. It is typically characterized by antecedent infection of the respiratory tract, chest pain, fever, tachycardia, pericardial friction rub, electrocardiographic changes, and a tendency toward both pericardial and pleural effusion. It has been referred to as idiopathic, epidemic, primary, non-rheumatic, benign, relapsing, cryptic, fugitive, and recurring pericarditis.²

This disease entity was probably first described by Hodges in 1854.³ In 1942, Barnes and Burchell,⁴ of the Mayo Clinic, reported 14 cases

of acute nonspecific pericarditis simulating myocardial infarction. Since that time, numerous reports describing this disease have appeared in the literature. This is probably due to its recognition as a specific entity rather than to any actual increase in the frequency of acute nonspecific pericarditis. It is a relatively rare disease. Only 1 reported series has included more than 30 cases.⁵ The true incidence of this disease is difficult to ascertain. Diligent search for specific etiology should be carried out in each case. Its occurrence as a cause of acute pericarditis has been reported to vary from 10 per cent⁶ to 33 per cent.⁷ These percentages can be expected to vary considerably, depending upon the age, racial and socioeconomic status of the group studied, as well as the physician's awareness of acute nonspecific pericarditis as a definite entity.

DIAGNOSIS

Acute nonspecific pericarditis has generally been thought to be a disease of young adults. However, cases have been reported that occurred in children^{8,9} as well as in patients in their seventies.² The average age at which this disease has occurred is 35 to 40 years.^{2,5,7,9,10} The disease occurs in males 3 to 10 times more frequently than in females.^{2,11}

Upper respiratory infections commonly precede the onset of acute nonspecific pericarditis. The severity of such infection may vary from a simple respiratory infection to an atypical pneumonia. Its incidence has been reported in from 37 to 54 per cent of cases,^{2,5,7,9} with 1 series reporting an incidence of 80 per cent.¹¹

Pain is the predominant symptom of acute nonspecific pericarditis and occurs in practically all patients at some time during the course of their illness. Typically, it occurs rather abruptly after an indefinite period of malaise. It is usually substernal in location, with radiation to the left chest and shoulder. The pain is accentuated by deep respiration, cough, motion, and swallowing.² The difficulty in differentiating this pain from that of acute myocardial infarction is obviously great. The pain of acute nonspecific pericarditis is generally less severe and less gripping. Circulatory collapse is uncommon.⁵ Many

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variations of this pattern of pain may occur. Two cases presenting as acute abdominal conditions in which surgical exploration was carried out and 1 case presenting as low back pain have been reported.^{2,12}

Dyspnea is a prominent symptom in approximately one-half of the patients.^{2,5,7,9} It may be present even in those patients who do not show evidence of effusion or pulmonary infiltrate. Severe pain caused by respiration may cause rapid, shallow respiration.⁹

Fever is present in 80 to 90 per cent of the reported cases.^{2,5,7,9} It should be emphasized, however, that its presence is not essential in establishing this diagnosis.⁹ The elevation of temperature is usually in the range of 100 to 103° F. Tachycardia is also common.

Pericardial friction rub is the most important physical finding and is present in over 70 per cent of reported cases.^{2,5,7,9,11} Typically, the rub occurs early and may be transient or may last for several days. If all patients could be examined at the time of onset of the first symptoms of malaise, the reported incidence of pericardial friction rub would probably be much higher. The rub heard in acute nonspecific pericarditis is typically scratchy and to-and-fro in nature.⁹ It is usually heard over a relatively large area to the left of the sternum.² A pericardial friction rub usually precedes electrocardiographic changes.² It is thought that the disappearance of a friction rub is often coincident with the appearance of pericardial effusion.⁹

Leukocytosis is present in one- to two-thirds of the cases,^{2,7,9} usually ranging from 10,000 to 15,000 cells per cubic millimeter. Leukopenia is rare but has been reported.² Elevation of the sedimentation rate may be expected in from 70 to 90 per cent of cases. The highest sedimentation rate in any given case varied from 15 mm. per hour to over 100 mm. per hour in one reported series.⁷ The return of an elevated sedimentation rate to normal has proved an accurate index of improvement in clinical status.⁵

Electrocardiographic changes in pericarditis are characteristic and are almost invariably present and, therefore, are of great diagnostic value. These changes are due to the pericarditis per se, the extent of injury to the subepicardium and possibly, to deeper layers of the myocardium, and to the amount of pericardial effusion.⁷ The elevation of the S-T segment with upward concavity in one or more leads occurs early. Within a period of a few days to a week, this elevation returns to the normal isoelectric level. Shortly thereafter, the T wave becomes inverted in several of the limb and unipolar limb and chest

leads. A discordant relation of the T wave in leads I and III occurs very seldom, and a significant Q wave almost never appears.¹³ The inverted T waves usually become upright in six to twelve weeks, but Carmichael reported 6 patients with apparently permanent T wave inversion following acute nonspecific pericarditis.⁵ Prolongation of the P-R interval, which is common in rheumatic pericarditis, is not seen in acute nonspecific pericarditis.⁷ Since a changing electrocardiographic pattern is characteristic of pericarditis, the necessity of taking serial tracings when this disease is suspected is obvious.

Enlargement of the cardiac silhouette as shown by x-ray examination is a common finding in acute nonspecific pericarditis. It is present approximately 50 per cent of the time.^{2,5} Much controversy exists concerning whether the enlargement of the cardiac silhouette represents cardiac dilatation or pericardial effusion or both. Ordinary roentgen examination usually does not resolve the problem.⁷ Opinions in the literature vary from stating that cardiac enlargement is commonly due to pericardial effusion² to statements that cardiac dilatation is the cause of enlargement in 94 per cent of the cases.⁵ That pericardial effusion can cause enlargement of the cardiac silhouette has been proved by pericardiocentesis.⁹ Cardiac tamponade in acute nonspecific pericarditis is relatively uncommon. For this reason, pericardiocentesis has been performed infrequently in this disease. Price and associates,¹⁴ in reviewing this subject in 1956, found reported records of only 20 pericardiocenteses that had been performed in acute nonspecific pericarditis. In 10 of these patients, serous fluid was obtained, and, in the other 10, sanguineous effusions were present. In no case was a sanguineous effusion reported before the tenth day of illness. The use of angiocardiology has been suggested as a practical method of differentiating pericardial effusion from cardiac dilatation.¹⁵ Recent improvements in surgical techniques have made pericardial biopsy and the creation of a pleuropericardial window practical.¹⁶ This method of treating cardiac tamponade caused by pericardial effusion will probably replace pericardiocentesis in the future. Therefore, angiocardiology diagnostically may become increasingly important.

Approximately one-half of the patients show evidence of pulmonary involvement, occurring as pneumonitis, pleuritis, and/or pleural effusion.^{2,7,9} Pleural effusion has been reported in 25 per cent of the cases.¹⁷ Effusions are usually left-sided or bilateral. Right-sided effusions are uncommon.² When pleural effusion is present, it

should, of course, be examined in an attempt to establish a specific etiology.

ETIOLOGY

The etiology of acute nonspecific pericarditis is unknown, as its name implies. The widely differing course of the disease from one case to another suggests that the condition can be caused by more than one agent.⁷ It is generally felt that acute nonspecific pericarditis is a viral disease, although a specific virus has as yet not been identified. That viruses can cause pericarditis has been shown by its coincident occurrence in diseases of known viral etiology. Instances have been reported of its occurrence in association with lymphogranuloma venereum,¹⁸ Bornholm disease,¹⁹ and primary atypical pneumonia.²⁰ A relationship between acute nonspecific pericarditis and infectious mononucleosis has also been reported.^{21,22} Evidence supporting the virus theory is the antecedent respiratory infection, the occasional occurrence of the disease in epidemics, and its usually benign course. Against the viral etiology is the fact that virus organisms have never been recovered from a pericardial effusion.⁹ Significant cold agglutinin titers in patients with acute nonspecific pericarditis rarely occur.^{2,7} The usual lag between the respiratory infection and the pericarditis and the usual presence of leukocytosis also mitigate against the virus theory of etiology.

Dressler¹⁰ has suggested that acute nonspecific pericarditis is of rheumatic etiology. He stresses its great similarity to the postcommissurotomy syndrome, which is thought to be of rheumatic origin. He also stresses the fact that acute rheumatic fever in adults is often an atypical, benign process which may heal without residual heart disease. This and the fact that acute nonspecific pericarditis is primarily a disease of adults, he feels is more than mere coincidence. Against the rheumatic theory is the infrequency of joint involvement in this disease. A history of acute rheumatic fever in the past is rare. When pericarditis does occur in acute rheumatic fever, it seldom becomes manifest before the joint symptoms are noted.²³ No pathologic evidence of rheumatic disease has been obtained in cases of acute nonspecific pericarditis which have come to surgery or necropsy.²

Tuberculosis has often been advanced as an etiologic explanation of acute nonspecific pericarditis. The well-known fact that pericarditis, as well as pleural and pericardial effusions, may occur with tuberculosis and may defy specific diagnosis for long periods of time favor this theory. Against this theory is the fact that peri-

carditis in tuberculosis is usually painless and seldom, if ever, runs a benign course. Surprisingly, little information is available in the literature regarding the incidence of positive tuberculin reactions in acute nonspecific pericarditis. One author states the tuberculin reaction is often negative.⁵ Another reports 5 positive reactors in 10 patients.²

Many other etiologic theories have been postulated. Cases have been reported occurring in allergic diseases.²⁴ Toxins have been implicated by some who point to the frequent occurrence of pericarditis in uremia to support this hypothesis. The relationship of acute nonspecific pericarditis to polyserositis and to various types of arteritis is often mentioned but has not been fully investigated in either instance.⁹

PATHOLOGY

Although pathologic reports in acute nonspecific pericarditis are few in number, owing to its generally benign course, those reports that are available all establish the pericardial nature of the disease. An organizing, nonspecific pericarditis is found. Coronary vessels and myocardium are grossly normal. Polymorphonuclear leukocyte infiltration of the myocardium adjacent to the epicardium has been described.⁹

DIFFERENTIAL DIAGNOSIS

The diagnosis must be made by carefully excluding other forms of acute pericarditis and other diseases which cause chest and abdominal pain. The specific causes of acute pericarditis listed in the introduction often become apparent after an adequate history has been taken, a physical examination has been done, and appropriate laboratory studies have been obtained. The presence of pain alone, however, introduces a large number of diagnostic possibilities, including myocardial infarction, coronary insufficiency, pneumonia, pleuritis, mediastinitis, pleurodynia, herpes zoster, intercostal neuralgia, diaphragmatic hernia, and acute abdominal conditions.⁹ Of these, the most important by far and often the most difficult to differentiate is acute myocardial infarction. The treatment and prognosis in acute nonspecific pericarditis and acute myocardial infarction are quite different, as will be noted. Krook⁷ reviewed the cases of acute myocardial infarction occurring in patients under the age of 45 at Malmo General Hospital in Sweden from 1943 to 1952 and found that 4 cases were diagnosed acute myocardial infarct, where as, in retrospect, these patients actually had had acute nonspecific pericarditis. In general, this experience has probably been the rule rather than the

exception. The onset, location, and radiation of pain may be similar in both diseases, but the accentuation of pain by motion, respiration, and coughing favors pericarditis. The pain is usually more severe in myocardial infarction, and circulatory collapse is more common. Both diseases occur predominantly in males, but acute nonspecific pericarditis occurs generally in a younger age group. History of an antecedent upper respiratory infection and/or the presence of pulmonary inflammation, as well as the early appearance of a pericardial friction rub, all favor the diagnosis of acute nonspecific pericarditis. Leukocytosis and elevation of the sedimentation rate occur earlier in pericarditis. The importance of serial electrocardiograms when this diagnostic problem arises cannot be overemphasized. Transaminase determinations may become an increasingly useful diagnostic study, often being elevated in myocardial infarction and normal in pericarditis.

Dressler²⁵ recently reported 10 cases of pleuro-pericarditis after proved myocardial infarction which have closely mimicked acute nonspecific pericarditis, which he calls the "post infarction syndrome." Its significance is not as yet clear.

COURSE AND PROGNOSIS

The natural course of acute nonspecific pericarditis may be summarized in the following manner. It is usually a benign disease. Recurrences are frequent. Late chest pain is common. Constrictive pericarditis is seldom a late complication. The electrocardiogram may occasionally show persistent abnormalities.

This disease usually runs a benign course, lasting anywhere from two to seventy days with an average of approximately two weeks. However, 5 fatal cases have been reported in the literature.^{14, 26-29} Cardiac tamponade, although rare, should be watched for carefully because pericardiocentesis or the surgical creation of a pleuropericardial window may be lifesaving in such a situation.

Recurrences have been reported in 15 to 35 per cent of the cases.^{2, 4, 5, 7, 9} Recurrent episodes of acute nonspecific pericarditis are usually less severe than the initial attack and are seldom preceded by an upper respiratory infection. Transient bouts of vague chest pain of varying intensity, occurring months and even years after the initial illness, have been even more common in the few patients in whom an adequate follow-up has been possible.⁵

Although all authors agree that constrictive pericarditis is a rare sequel to acute nonspecific pericarditis, opinions differ greatly as to whether

it actually happens. Dalton and associates,³⁰ in reporting 78 cases of constrictive pericarditis, stated that an intensive study was not made to elucidate the etiology of the disease. However, one fact stood out, and that was that when the etiology was unequivocal, it was invariably tuberculous. Carmichael,³¹ in 1955, stated that no well documented cases of chronic constrictive pericarditis occurring after acute nonspecific pericarditis had been reported. Rabiner and associates³² reported a case of a patient in whom constrictive pericarditis developed after nonspecific pericarditis, who was treated surgically with good results. Many aspects of the case, however, suggested a tuberculous etiology. In another series of surgically treated patients with pericardial effusion, Proudfit and Effler¹⁶ reported 5 cases of sanguinous pericardial effusion of undetermined etiology. They suggested that chronic constrictive pericarditis would probably have developed later in these patients. Krook⁷ feels that the late sequelae of constrictive pericarditis is more frequent than we suspect and reports 2 such cases occurring after acute nonspecific pericarditis. He also points to the high frequency with which adherent pericarditis is found at autopsy in patients dying of other causes and the fact that in only a relatively small percentage of such cases was a history of pericarditis due to a specific etiology elicited in their medical history.

Three patients showing evidence of residual myocardial injury long after the initial acute nonspecific pericarditis had subsided have been reported.¹⁷ Persistent, apparently permanent, electrocardiographic changes have been reported in as much as 12 per cent of the patients.⁵ These changes have consisted primarily of abnormal T wave inversions. The appearance of such T wave abnormalities in an otherwise healthy young male suggests the possibility that an undiagnosed acute nonspecific pericarditis has occurred at some time in the past.

TREATMENT

The treatment of acute nonspecific pericarditis is symptomatic. Patients may be ambulated as soon as their symptoms allow, although activity should be limited until all signs and symptoms of their disease have disappeared.² Because of the potential complication of hemorrhagic pericardial effusion,^{14, 16} which may be fatal,^{27, 29} the use of anticoagulants is definitely contraindicated and again emphasizes the importance of early accurate diagnosis of this disease.

There is an occasional report in the literature suggesting that antibiotics are of value in treatment.^{33, 34} Most authors, however, are of the

opinion that antibiotics are of no specific benefit.^{35,36}

The use of corticotrophin and cortisone has been reported in the treatment of patients with acute nonspecific pericarditis who were very toxic and steadily becoming more ill. Reports of at least 12 patients so treated are available.^{2,8,9,37-39} In all but one instance,⁹ the course of the patient's illness promptly improved and the patient recovered. When cortisone was discontinued, one patient³⁸ suffered a relapse but responded when cortisone therapy was resumed and remained well after it was gradually discontinued three weeks later. It is postulated that the steroid therapy suppresses inflammatory responses during the acute phase of the illness but does not otherwise alter the natural course or duration of the disease.⁸ It would seem that the use of steroids in a dosage equivalent to 25 mg. of cortisone four times a day is indicated in a

severely ill patient.³⁸ The evaluation of such non-specific therapy in a usually benign disease must be evaluated critically and such therapy should not be used indiscriminately. We must remember that the use of a "blister" one century ago was thought to be helpful specific therapy.³

SUMMARY

1. The incidence and diagnosis of acute nonspecific pericarditis have been discussed.
2. The most prevalent theories of etiology have been presented.
3. The difficulty and importance of differentiating acute nonspecific pericarditis from acute myocardial infarction have been emphasized.
4. Recurrences are common, but late complications in acute nonspecific pericarditis are rare.
5. Treatment is symptomatic. The careful use of corticotrophin or cortisone may be indicated in selected cases.

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Spontaneous Subarachnoid Hemorrhage

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SUBARACHNOID HEMORRHAGE is typically defined as a sudden onset of headache, often with the feeling that something has snapped in the head and followed by a greater onset of severe occipital pain, nausea, and vomiting with pronounced rigidity of the neck muscles, positive Kernig's and Brudzinski's signs, and blood by spinal puncture. These symptoms are caused by free blood in the subarachnoid space.

INCIDENCE

Spontaneous subarachnoid hemorrhage is said to be responsible for 2 per cent of sudden unexplained deaths.¹ Baker² says that it is the second most common cause of central nervous system deficit in the young adult age group. The sex incidence in various series shows that the distribution is just about equal.

The disease is generally conceded to have an incidence of about 1/15 that of a cerebrovascular accident (thrombosis or intracerebral hemorrhage). Berg³ noted that polycystic disease of the kidney is definitely associated with berry aneurysms (one of the causes of spontaneous subarachnoid hemorrhage). He found aneurysms could be noted in 1 per cent of autopsies, but, in patients with polycystic kidney disease, 16 per cent had intracranial aneurysms at autopsy. He also feels there is an association between intracranial aneurysms and hypertension, coarctation, and patent ductus arteriosus.

ETIOLOGY

The etiology of subarachnoid hemorrhage varies to a degree with different authors because of their exclusion of different entities. Trauma and birth injury are excluded by the definition "spontaneous." Therefore, anything that produces blood in the subarachnoid space fits the classification. Included in the causes are extension of an intracerebral hemorrhage into the subarachnoid space, arteriosclerosis, congenital aneurysms, syphilis, septic emboli, angiomas, blood dyscrasias, acute hemorrhagic infections, eclampsia, tumors, thrombosis of a longitudinal sinus, and even subdural hematoma. In most of these

conditions, however, very small amounts of blood appear in the subarachnoid space. Grossly bloody fluid usually indicates rupture of a blood vessel in the subarachnoid space—usually an aneurysm, arterial angioma, or arteriovenous malformation. Walton,⁴ excluding atherosclerotic intracerebral hemorrhage bursting into a ventricle, trauma, and birth, listed these factors as the causes of the disease: aneurysmal rupture, 80 per cent, rupture of an angioma or arteriovenous malformation, 10 per cent, and other conditions, 10 per cent.

This discussion will be concerned with the two former conditions.

CLINICAL FEATURES

There is scarcely a more dramatic syndrome in its onset and development than subarachnoid hemorrhage. Most authors do not correlate exercise with onset, but, in McCutchan's¹ patients, two-thirds were working hard at time of onset. The characteristic symptoms of this disease are the result of blood irritating the meninges and increasing the cerebrospinal fluid pressure. There are, however, general systemic symptoms, localizing symptoms in some cases, and some which suggest etiology.

The symptoms caused by blood entering the subarachnoid space depend on the speed at which the bleeding occurs. If bleeding occurs slowly, the patient may have only a headache and stiff neck for a week, or he may rapidly lose consciousness within a few minutes if the blood loss is sufficiently extensive. In the average case, there is an acute onset of a violent headache, often accompanied by a feeling that something has snapped inside the head, and followed by vertigo, vomiting, and stiffness of neck in 50 per cent of cases. Most patients pass at least into a state of semistupor, but some never lose consciousness. The majority of patients lie in an attitude of general flexion, resent interference, and are confused and irritable when aroused. During this period, moderate pyrexia is common, photophobia is not unusual, and seizures occur in 3 per cent.⁴ Findings due to the increased intracranial pressure include papilledema, which is usually slight, occurring most often on the side of the hemorrhage, though it may

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be bilateral. Subhyaloid hemorrhages are not uncommon. Fundi changes are usually related to the proximity of the optic nerves to the hemorrhage. Other nonlocalized findings are those of third or sixth nerve palsies and diminution of tendon and abdominal reflexes.

Localized findings are most frequent when the etiologic bleeding point is closely applied to brain substance, that is, anterior communicating and middle cerebral ruptures are more likely to cause localization than rupture of the internal carotid artery, which is loose in the subarachnoid space.

Focal symptoms are more likely to occur with rupture of an arteriovenous malformation, in the ratio of 8:1, but these are, of course, of no help in diagnosing the individual case.

Premonitory signs occur most often with the angiomatic malformation but also can occur with aneurysms, consisting of visual field defects, focal seizures, previous bleeding episodes, and migrainous-type headaches. Laboratory findings include pyrexia, leukocytosis, occasional albuminuria and glycosuria, and increased spinal fluid pressure. For two to three days, the fluid is grossly bloody and, providing bleeding stops, is xanthochromic for about two to three weeks. The protein content is elevated, though rarely above 100 mg. There can be up to 3,000 white blood cells in the fluid (dilution of the blood).

The diagnostic workup should include skull roentgenograms and an electro-encephalogram, although usually both are noncontributory. The skull film may occasionally show calcification in the case of an angioma. The differential diagnosis is only in doubt in the occasional case in which the patient is so comatose that his neck is not stiff, in which case, the diagnosis is that of the comatose patient. Ordinarily, the only question is that of meningitis, and the spinal tap for pressure, cells, culture, smear, and protein rules this condition out. Incidentally, meningeal irritation is the one indication for spinal tap with choked disk. However, even then it can cause herniation of the medulla and should be carefully performed.

There is some differential symptomatology of angioma versus aneurysm, and these findings differ to a certain degree with the position and pathology. Let us first discuss the aneurysm.

Intracranial aneurysm. Pathologically, the berry aneurysm is a 1 to 5 mm. (up to 30 mm.) swelling at the junction of two of the components of the circle of Willis or at a bifurcation of one of the cerebral arteries. Brain⁵ feels that the aneurysm may be congenital, but it is apt to develop at any time in life on the basis of

congenital structural deficiency, that is, a weakness in the media. Microscopically, these media are extremely narrow and fibrous, and the elastic and muscular elements are absent. Brain states that 80 per cent of these rupture sooner or later, but Hamby⁶ reports an autopsy incidence in all patients of about .5 to 1 per cent. Aneurysms are felt to be multiple in 15 per cent of cases.

Where are the lesions most likely to occur? Again, this is difficult to assess as they are listed as ruptured, unruptured, and arteriosclerotic, inclusive, in different series. A fairly typical series of locations of ruptured aneurysms is that found in Baker's² book, which lists McDonald's series of 786 cases.

Anterior communicating, 109
Middle cerebral, 247
Anterior cerebral, 75
Internal carotid, 106
Junction of internal carotid and posterior communicating, 26
Junction of anterior cerebral and anterior communicating, 28
Posterior communicating, 29
Posterior cerebral, 23
Basilar, 89
Vertebral, 42

The posterior fossa ruptures are felt to constitute about 25 per cent of the ruptures.

It has been previously mentioned that aneurysms are less likely to cause symptoms prior to rupture than arteriovenous malformations, but Brain⁵ feels that 25 per cent may cause symptoms prior to rupture. However, recurrent headache is the symptom he lists as most frequent, which makes it valueless as a diagnostic, localizing procedure. Internal carotid aneurysms, however, may produce visual field defects. Middle cerebral aneurysms may cause monoplegia and hemiplegia and result in convulsions prior to rupture. Posterior fossa (vertebral and basilar arteries) may cause crossed hemiplegia.

Angiomatic malformations. These are rarer than aneurysms, of course, being responsible for about 1 per cent of neurologic admissions. They are best divided into 3 types:

1. *Telangiectasis* is a small group of dilated capillaries. The condition occurs in Rendu-Osler-Weber disease. Of rare significance clinically in rupture because it rarely causes symptoms.

2. *Venous angiomas* are wedge- or cone-shaped masses of veins which may be superficial but usually extend deeply into white matter. These too are uncommon causes of hemorrhage. These produce no bruit and do not enlarge because they have no arterial supply. They are relatively less symptomatic than the next group.

3. *Arterial angiomas (arteriovenous aneurysms)*

are also wedge-shaped lesions extending deep into the brain parenchyma. They are supplied with blood by one or more large arteries. For that reason, they can enlarge. Also, they may contain arteriovenous fistulae. They are composed of arterial-like vessels, as opposed to the venous angiomas. The arteriovenous fistulae in these lesions may be of sufficient magnitude to cause heart failure.¹

These lesions are predominantly in the domain of the middle cerebral artery, thereby contributing to their seriousness. Because of this common distribution in one-half of them, a frequent presenting symptom is epilepsy. Because of their intracerebral nature, these lesions are much more apt to produce symptoms prior to a hemorrhage. Of differential diagnosis, there are, according to Mackenzie,⁷ (1) multiple previous bleeding episodes and (2) focal seizures. These factors greatly favor ruptured arteriovenous malformation over a ruptured berry aneurysm, as do (3) progressive neurologic deficit prior to hemorrhage, (4) bruit, which is diagnostic, and (5) migrainous headaches prior to hemorrhage, but these conditions can occur too with an internal carotid aneurysm.⁴ During the acute hemorrhage, the ruptured arteriovenous lesion usually causes more direct brain damage because of its location, but this is not of help in the diagnosis of an individual patient. In 70 per cent of patients with angiomas, the first symptom occurs before age 30.

TREATMENT

There are almost as many methods of treatment as there are authors, and lack of controlled studies is to be expected because of the emergent nature of the disease and the fact that each patient must be treated individually.

Most physicians feel that the patient should be treated conservatively until the bleeding stops. The patient should be made as comfortable as possible and restlessness should be allayed so that further bleeding will not occur. Phenobarbital and codeine are indicated. Hourly vital signs should be observed, and temperature must be taken each four hours because fever is often the first sign that bleeding has recurred. Walton⁴ feels that lumbar puncture should not be used as a daily routine treatment, not so much because it may cause bleeding to recur but because he feels the procedure is of no benefit and may introduce herniation of the medulla. He repeats lumbar puncture only for intense symptomatology, the inspection of continued fresh bleeding, or evaluation of surgical treatment. Most all authors believe in taking only

a few cubic centimeters, which can be used for cell-count culture and protein, and the pressure can still be reduced somewhat for comfort. Fluids, of course, should be given to maintain the electrolyte situation. From this point on, the treatment varies. If the patient fails rapidly, some authors feel that nothing can be done.⁸ Others feel that immediate carotid ligation in the neck should be done as an emergency measure.

Usually, however, after the third day, the bleeding has stopped, and most authors feel that angiography is indicated. Bilateral carotid angiography should be done because 20 per cent of aneurysms are multiple, and, in the case of anterior aneurysms, one must know the source from which they are fed and on which side they are located. Twenty per cent of the carotid angiograms are negative. Basilar angiograms are felt to be indicated by some. Others do not believe they are worthwhile because of the difficulty in assessing them surgically. The angiogram can demonstrate both aneurysms and arteriovenous malformations.

Norlen and Olivecrona⁸ feel that the time for surgery in at least one-half of the patients should be between three to fourteen days after hemorrhage occurs, because after that the vessels dilate, the clot loosens, and bleeding is most apt to recur. This is the point at which treatment of the angiomatous malformation and the berry aneurysms differ.

The aneurysms differ as to location:

1. Intracranial internal carotid aneurysms are the easiest to attack surgically by the intracranial trapping method and comprise about 25 per cent of all aneurysms.

2. Anterior communicating and anterior cerebral aneurysms include 28 per cent of demonstrated aneurysms. These are more difficult to treat, particularly because they feed from both sides in so many instances. French⁹ has had much success in treating this type.

3. Middle cerebral aneurysms comprise 30 per cent of these lesions. Their prognosis is poor because of the difficulty in trapping the aneurysm and the resultant hemiplegia.⁷

4. Vertebral and basilar arteries offer little surgically, but some authors have done vertebral artery ligation with success.¹⁰

The surgical attack on aneurysms, as well as on malformations, is the only real hope for improvement in prognosis. The majority of authors feel that the attack on intracranial aneurysms is no better than conservative measures in the first three days but that it provides protection against later recurrence.¹¹ Recurrences can occur as late

as twenty years after the original hemorrhage.

Surgical attacks on angiomas or arteriovenous malformations are at best rather poor because of the deep infiltrating nature of the lesions. A few respond to radiation. Carotid ligation is not so valuable. Block resections of areas of the brain have been performed with some success. Occasionally, tying off a feeding vessel can help, but it is difficult to decide and be sure whether it is the only feeding vessel.

There is no really controlled series from which to determine whether surgery is better than medical treatment because no group contains the same patients. Falconer cites mortality rates of 50 to 60 per cent in conservatively treated patients as against 20 per cent after surgery. However, his was a group of only 50 patients. Most authors believe that surgery offers the only hope for increasing recoveries after the first three days.

PROGNOSIS

The prognosis is worse, of course, with increasing age,⁴ recurrent bleeding, and severe neurologic signs. Most authors found that about one-third of nonsurgically treated patients died during the first attack and 20 per cent more after a recurrence in the second week.¹²

Hamby's report⁶ shows, in 130 cases treated conservatively, a 45 per cent mortality with first attack and 72 per cent of survivors in the second attack. Symptoms which seem to predispose to poor prognosis in the first attack include coma for more than one day, high blood pressure, hemiplegia, high temperature, recurrent fever, and convulsions.⁴ Hyland¹³ feels, like others, that an angiomatous etiology presents a much graver situation because the brain tissue is much more apt to be involved. Walton collected 1,300 cases throughout the literature and found that 581 (44.7 per cent) died in the first eight weeks, which included the first recurrence.

Of his own group, Walton says that of the 120 survivors he was able to follow, 4 per cent were completely disabled. Of the rest, one-third had fairly serious sequelae, consisting of paralysis 10 per cent, convulsions 13 per cent, severe headache 37 per cent, mental deterioration 9 per cent, and anxiety 27 per cent. Another one-third had trivial sequelae and one-third had no symptoms. Comparative studies are very hard to analyze in those who have had surgery because of differences in age, surgical technic, location of aneurysm, and the type of operation. However, the general impression is that the prognosis is better after the first three days.² In Falconer's series of 50 who were treated surgically, mortality was only 20 per cent, and only 3 patients were disabled after surgery. Not as great a number of series has been treated surgically as conservatively, and, in medical series, reports varied from 28 to 63 per cent deaths. For that reason, statistics at present mean little. In Jacobson's¹⁴ group of medically treated patients, 11 per cent of those who recovered were permanently maimed. The prognosis of recurrence after the first six months of those who live another six months is only 10 per cent.⁴ The prognosis in surgically treated patients varies with the site and type of operation, but it is felt that surgery greatly decreases the possibility of later bleeding.

SUMMARY

Some factors about symptoms and prognosis of subarachnoid hemorrhage have been discussed. It is apparent that longer periods of study are required before final conclusions can be drawn concerning the most effective type of treatment. Spontaneous subarachnoid hemorrhage is a serious disease with a rather poor prognosis. It is felt that surgical techniques reduce the death rate to some extent and offer the greatest hope of cure.

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Rectal Bleeding in Infants and Children

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RECTAL BLEEDING is a fairly common complaint in an office practice dealing with infants and children. In hospital practice, on the other hand, it is a much less common but much more serious sign. Blood in the stool is always disturbing to parents and, fortunately, leads them to the physician. Because of the grave implications in hospital cases and the necessity for the physician to decide between serious and benign lesions, it is important that all of these children be regarded carefully. Any case of rectal bleeding demands a detailed history and physical examination with a rectal and proctoscopic examination when indicated. Even with the most careful study, some 10 to 20 per cent of cases cannot be clearly diagnosed. For this reason, the examination must be meticulous in all details.

In taking the history of these patients, it is important to learn the nature of the blood passed: its color, whether clotted or not, whether mixed with stool or not, whether there is mucus or pus, its amount and duration, and any associated symptoms. The relationship to the bowel movement may be helpful. This detailed description of the stool must be obtained. If possible, the physician should see the stool himself.

Armed with this information, a differential diagnosis can be outlined which precludes costly mistakes. As a general rule, bright red blood passed by the bowel has been said to come from the lower portion of the gastrointestinal tract, and, although this is generally true, it may prove wrong in specific cases. The various causes of rectal bleeding are shown in table 1. These are grouped according to the appearance of the blood in the stool. The first column shows the commoner causes of bright red blood in the stool, and the second column shows the rarer causes.

To avoid errors of omission, all these diagnoses must be considered. When bright and

dark red blood is mixed, the causes usually stem from disorders higher in the gastrointestinal tract, which are shown in column 3. Black and tarry blood, due to the action of hydrochloric acid which produces acid hematin, is usually the result of lesions in the upper gastrointestinal tract or above, which are shown in column 4.

There are several substances which can be confused with blood and, on occasion, cause difficulty. These are shown in column 5. Parents often mistake blood in the stool for the red color produced by various drugs, such as Achromycin. One of our recent cases of intussusception was not seen for thirty-six hours because the parents mistook blood and mucus for the Achromycin the child was taking by mouth. Beets are a well-known offender, and uric acid leaves a pink stain on the diaper which may mislead the unwary.

This discussion will be limited to the first and most important group, that in which bright red blood is passed by bowel. However, it must be remembered that the stool findings depend on the state of motility of the bowel as well as the size of the hemorrhage. Thus, any of the conditions outlined in the third and fourth columns can produce bright red blood in the stool if bowel motility is increased and the hemorrhage is fairly large.

In approaching this problem, the first consideration is the frequency with which these outlined causes occur. Table 2 indicates the relative incidence in hospital practice of the various conditions which may cause bright red rectal bleeding. These figures represent the incidence over a five-year period of the causes seen in column 1 of table 1. The difference between hospital experience and office practice is striking.

The most frequent and serious cause of blood in the stool is intussusception. This condition must be excluded at once in any case of rectal bleeding, for a missed diagnosis in such instances may be fatal. This is the group in which many of our diagnostic difficulties arise. Classically, intussusception occurs primarily between the ages of 5 and 7 months in a well child. The onset is usually characteristic, with sudden, violent, crampy pain and vomiting unassociated with diarrhea but accompanied by progressive shock.

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TABLE 1
CAUSES OF RECTAL BLEEDING

<i>Bright red blood</i>		<i>Mixed blood</i>	<i>Black</i>	<i>Common errors</i>
<i>Common</i>	<i>Rare</i>			
Intussusception	Foreign body	Purpura	Nosebleed	Drugs—Achromycin
Leukemia	Hemorrhoid	Trauma	Peptic ulcer	Foods—beets
Meckel's diverticulum	Purpura	Peptic ulcer	Violent vomiting	Uric acid
Fissure-in-ano	Hemophilia	Typhoid	Esophageal varices	
Rectal polyp	Mesenteric thrombosis	Nursing blood	Hemophilia	
Hemorrhagic disease	Erythroblastosis fetalis	Hemophilia	Purpura	
Volvulus	Obstructive jaundice	Neoplasm	Trauma	
Dysentery	Neoplasm	Hemorrhagic disease	Hemorrhagic disease	
Nursing blood		Colitis	Nursing blood	
			Tonsillectomy	
			Duplication of bowel	

TABLE 2
CAUSES OF RECTAL BLEEDING
CHILDREN'S HOSPITAL, 1951-1955

Intussusception	26
Leukemia	17
Meckel's diverticulum	13
Fissure-in-ano	12
Rectal polyp	9
Hemorrhagic disease	6
Volvulus	5
Dysentery	1
	89

These symptoms should suggest the diagnosis before the appearance of the typical bloody, currant jelly stools. A palpable, sausage-shaped, doughy tumor may be felt in the right upper quadrant, and blood is obtained on rectal examination. With increasing clinical awareness, only about half of our cases have bloody stools when they are first seen.

Diagnosis may be confirmed by barium enema with the results shown in figure 1, which shows clearly the "coiled spring" appearance of the intussusception. Our greatest difficulty has been with ileoileal intussusception in which a characteristic story is given, but no mass is palpable and no blood is passed by rectum. This condition must be diagnosed by a flat plate of the abdomen showing small bowel obstruction with fluid levels when the child is held upright as seen in figure 2. This should be followed by barium enema. The commoner ileocecal type and the rare colicocolic type cause less diagnostic difficulty because blood appears earlier in

the stool. It is imperative to diagnose intussusception within twenty-four hours after the onset if resection of necrotic bowel is to be avoided.

Kiesewetter and associates¹ recently pointed out the importance of chronic recurrent sigmoid intussusception. In the case of a dolichocolon, the redundant sigmoid may readily telescope down into the lower bowel when the child strains. This has been revealed by sigmoidoscopy. The leading edge may then bleed and produce melena.

Treatment is tending to revert to medical



Fig. 1. Intussusception showing "coiled spring" appearance.

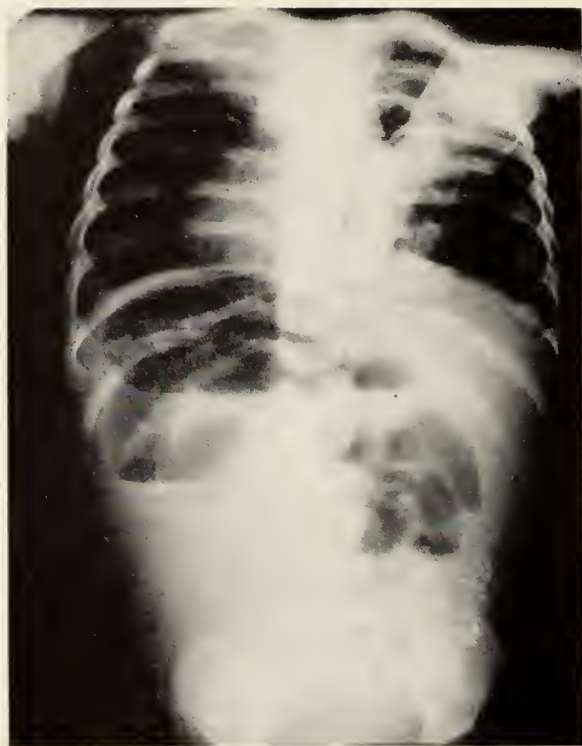


Fig. 2. Flat plate of abdomen showing small bowel obstruction with fluid levels.

management by barium enema reduction. This reflects the management of over one hundred years ago,² and, in careful hands with conservative management, 50 per cent of cases can be satisfactorily reduced.³ However, if reduction fails or if a second intussusception occurs, surgical intervention is essential. Since about 10 per cent of cases have a Meckel's diverticulum, lymph gland, polyp, or tumor of the bowel which precipitates the bowel intrusion, an operation is necessary to remove the cause. Many small bowel lesions are difficult to demonstrate clinically, and a laparotomy may be the only successful method. Even with surgical exploration, some cases recur two or three times without explanation.

Leukemia usually bleeds late in its course when other signs and symptoms make the differentiation easy. This error can be avoided with a routine blood count. Similarly, the various clotting and nutritional disturbances usually produce other signs and symptoms.

Meckel's diverticulum or omphalomesenteric duct with hemorrhage is a clinical diagnosis. These cases present with either bright or dark red, massive, painless bowel hemorrhage, with clots and no other findings. The Meckel's diverticulum is difficult, if not impossible, to demonstrate by x-ray with contrast media, and only one or two have been demonstrated in Victoria Hos-

pital, London, Ontario, in the past ten years. A laparotomy is performed in these cases only after a second occurrence of bleeding unless the initial hemorrhage has been extreme. This prevents unnecessary operation, for it is well accepted that small bowel lesions are practically undetectable, and many other causes may be confused with a hemorrhaging Meckel's diverticulum. For example, reduplication of bowel, which also has gastric mucosal rests in it, is not infrequently mistaken for Meckel's diverticulum. The management is the same — laparotomy. In all cases, the patient is transfused preoperatively as blood loss may be considerable.

Fissure-in-ano is the commonest cause of bleeding in infancy that is encountered in office practice. A hard stool produces a fissure and a blood-streaked stool in an infant. These fissures, in contradistinction to adults, are readily healed by keeping the stools soft with a mild laxative and the fissure clean by washing, followed with an antibiotic ointment containing tyrothricin, bacitracin, or other nonabsorbable antibiotics. On this routine, the fissure usually heals in about one to two months. The radical surgery used in adults is *not* necessary and is contraindicated.

Rectal polyp, the fifth cause of bleeding in hospital patients, is accepted as the commonest cause of massive rectal bleeding among patients in office practice. Blood is passed often after a stool. Diagnosis is easily made by doing a rectal examination, when most of these tumors are palpable within 1 in. of the anal orifice as a rounded mass the size of a pea. These are mucosal polyps and are often pedunculated. The remainder can be readily visualized by proctoscope and removed by fulgurization. Occasionally, these tumors develop at the anus as shown in figure 3.



Fig. 3. A polyp which developed at the anus.

Furthermore, polyps are sometimes multiple in quantity and distributed throughout the colon. These cases of multiple polyposis are familial in nature and usually have a more fibrous center which gives them a different gross appearance. These are frequently associated with pigmentation of lips.^{4,5} Celler⁶ has pointed out that these lesions invariably become malignant, and he recommends early colectomy. This procedure should not be undertaken until the polyps have been confirmed by two successive barium enemas in order to be sure they are not fecal balls.

Hemorrhagic disease of the newborn is the most common cause of bleeding in this period. It usually occurs on the third or fourth day postpartum and is accompanied by bleeding from the navel, vagina, kidney, nose, or by the vomiting of blood. Diagnosis can be made by clotting time and prothrombin time estimations. This condition is treated by the administration of fresh blood and vitamin K. Our English colleagues⁷ recently pointed out the danger of hemolysis that an excess amount of vitamin K may produce. They suggest that only 2 mg. be given and repeated once if necessary.

Hemorrhagic disease of the newborn must not be confused with nursing blood or swallowed blood. Apt⁸ has shown that 35 to 40 cc. of blood swallowed by an infant appears bright red in the stool in nine to thirty hours. The presence of this maternal blood can be determined by taking 1 cc. of blood and diluting it to 5 cc. with distilled water. To 5 cc. of this solution, 1 cc. 0.25 NNaOH is added. Maternal blood turns brown, while fetal blood turns pink.

Volvulus and mesenteric thrombosis are infrequent causes of rectal bleeding but must be considered in young infants with small bowel obstructions. The frequent congenital defects which come to light in this age group are usually the precipitating factors, such as malrotation of the gut and persistent omphalomesenteric duct. Characteristically, these babies present with tremendous abdominal distention, vomiting, crampy abdominal pain with tinkling bowel sounds, blood and mucus in one stool, and then no stools thereafter. A roentgenogram reveals signs of small bowel obstruction, and the treatment is, of course, surgical.

Dysentery is a more frequent cause of blood in the stool than the figures indicate. The diagnosis is usually not difficult, for the child has diarrhea with blood flecking or small drops of blood in the stool. This arises from ulceration of the small or large bowel. Culture of the stool reveals, in most cases, a member of the *Salmonella* group. Treatment with a broad-spectrum



Fig. 4. Photograph shows multiple purpuric spots in a child with Henoch's purpura.

antibiotic usually controls this infection. Chronic ulcerative colitis produces similar stools.

Two of the rarer causes of rectal bleeding which appeared in this series were Henoch's purpura and rectal prolapse. The purpura followed two weeks after an upper respiratory infection. This child presented with multiple purpuric spots (figure 4), and then bloody mucus appeared in her stools which resembled intussusception, as crampy abdominal pain accompanied it.

The second patient had severe prolapse of the rectum following malnutrition. This condition is usually accompanied by bright red rectal streaking, and, of course, the diagnosis is obvious (figure 5). Treatment consists of restoring



Fig. 5. Patient with severe prolapse of the rectum.

nutrition, strapping the buttocks, and administration of a sufficient amount of laxative to keep stools soft. Rarely, sclerosing solutions or surgical suspension are necessary.

In conclusion, a review of the various causes of rectal bleeding shows a considerable difference in the frequency of the types of cases seen in office and hospital practice. In the former, anal fissure and rectal polyps are the usual causes, while intussusception and Meckel's diverticulum are the important types seen most often in the hospital. It is because of the last two conditions that no case of rectal bleeding should be ignored, as both may be fatal or at

least produce serious stigmata for the rest of the patient's life after bowel resection.

The difficulty of diagnosing ileoileal intussusception has been stressed, and a high index of suspicion must be maintained if errors in diagnosis are to be avoided. The diagnosis of intussusception during an epidemic of gastroenteritis is extremely hazardous.

A careful and detailed history and physical, rectal, and proctoscopic examinations with roentgenograms, where indicated, help to prevent tragedy in cases of rectal bleeding. Clinical judgment in these cases may be taxed to the limit.

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EIGHTY PER CENT of premature infants pass their first stool within twenty-four hours after birth and 94 per cent within forty-eight hours. In comparison, 94 per cent of normal full-term infants pass the first stool within twenty-four hours.

Meconium retention in the newborn period suggests intestinal obstruction. Delayed or infrequent passage of meconium, with or without signs of intestinal obstruction, may be the first sign of Hirschsprung's disease.

Stimulation of the rectum with a thermometer or an enema of 10 to 15 cc. of normal saline may result in free passage of meconium. If not, and if other symptoms develop or a stool is not passed within the next twelve hours, the abdomen should be examined by roentgenograms for distended loops of bowel. If no abnormalities are seen, sterile water feedings may be instituted and the infant watched closely until a stool is passed.

All premature infants who have not voided by twenty-four hours should be observed carefully. If the external genitalia show no obvious abnormalities and the kidneys do not appear enlarged by palpation, the general condition of the infant determines further diagnostic measures.

IRVING KRAMER, M.D., and S. NORMAN SHERRY, M.D., Sinai Hospital, Baltimore. *J. Pediat.* 51: 373-376, 1957.

Office Gynecology

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THOUGH PATIENTS with gynecologic disabilities comprise a large part of general practice, most medical school curricula and hospital teaching programs are so filled that there is insufficient time to stress office procedures in gynecology. The material that I shall present is based on personal observations and experiences with practicality in mind.

Much may be learned from casual observation of the gynecologic patient as she walks into the office that may aid in diagnosis. Obtaining a history is still a great art. Diagnoses are often suggested by the history and may be missed if the physician is not a good listener. In many instances, a complete physical examination is required. This examination may reveal systemic causes for the gynecologic symptoms or extra-gynecologic lesions with symptoms that might be incorrectly interpreted to be of gynecologic origin.

The conditions to which the gynecologist's attention is called most often include inflammatory and infectious diseases, new growths, sequelae of labor, and endocrine dysfunctions that produce aberrations of menstruation. The patient often seeks counsel because of abnormal vaginal secretions, genital bleeding, or pelvic pain. Less often she may come because of protruding masses or generalized pelvic or abdominal discomfort. Still others may visit the office because of the persistent "cancer drives," which make them apprehensive and desirous of reassurance from the physician.

Whatever the cause, the number of such patients in the office of the gynecologist is increasing, for most clinics report that more and more patients go to the "office" gynecologist rather than to the "surgical" gynecologist. The net result is to place greater responsibility on the physician, for, if mass education sends more patients to him, he will be expected to detect

processes in earlier stages when treatment can be swift and effective and lives can be saved.

HISTORY

Much can be learned from an adequately taken history, which often reveals significant illnesses or symptoms that are otherwise missed. Many patients who come to the office with gynecologic complaints have no demonstrable organic disease. Often, they are merely indicating anxiety, fear, resentment, or guilt. The practical gynecologist must be a physician well skilled in the practice of gynecology and also a practical psychologist. He must integrate into his diagnosis the personality of the individual in order to treat her ailments properly. The following word of caution perhaps should be introduced here: the diagnosis of functional illness must be established not only by exclusion of organic disease but also on the basis of its own characteristics as well. Certain diseases can be treated by psychologic advice, but it is also possible to treat a neurotic individual incorrectly by physical measures. The best way to avoid improper, unnecessary, or even harmful treatment is to be sure of the diagnosis.

The medical history should provide pertinent information about the patient's family, her social background, occupation, sexual habits, marital problems, and so forth. Occasionally, the physician must be rather obtuse in exploring personal problems with the patient, for, if approached too directly, she may set up an antagonistic defensive attitude and obstruct further enlightening discussion. A distinguishing characteristic of the competent clinician is his ability to sense intuitively that which the patient is trying to express and to let her vent her feelings in such a manner that she will not be offended by apparent accusations. In gynecology more than any other specialty, the combination of disease with sexual problems requires an understanding of the psychology that was developed many years before.

PHYSICAL EXAMINATION

A general physical examination should follow the history and should, whenever possible, precede the pelvic examination.

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What to look for. In the general examination of the patient, much can be learned at a glance about her habitus and whether she has masculine or feminine characteristics, is robust or frail, hirsute or balding. The temperature, pulse rate, and blood pressure should be recorded. The breasts should be examined, for, as secondary sex characters, they share in many changes and physiologic conditions within the pelvis.

In the abdominal examination, the physician should note the presence or absence of striae indicative of rapid loss of weight and evidence of past pregnancies or endocrine dysfunction. Tender areas should be carefully palpated, and distinction should be made between rigidity and normal muscular defense reaction. Although an adequate abdominal examination is neglected by many, it actually may bring to the fore the primary difficulty at hand, especially if the patient is acutely ill or apprehensive. Incidentally, a full bladder has, at times, deceived the shrewdest of examiners. For this reason, some gynecologists have the patient void immediately before examination to forestall such a diagnostic pitfall.

Pelvic examination. Whatever is learned after the history and the physical examination must be gained tactually and correlated with information gained from both these procedures. To develop the tactile sense, one should do enough pelvic examinations to acquire the faculty of instant recognition not only of the normal anatomic relationship but also the minor aberrations that are the hallmarks of pelvic disease. One should become familiar with the nodular, tender areas involving the uterosacral ligaments and posterior uterine surface, so characteristic of endometriosis, and also with the thickened, tender, and bulbous swelling of the tubes portraying the aftermath of pelvic inflammatory disease.

Equipment. All the necessary equipment for the proper performance of a pelvic examination should be at hand before the examination is begun. This includes drapes, hand protection, lubricants, light, material for taking smears, and a table that offers the examiner every advantage.

Since the speculum is an indispensable instrument to the gynecologist, a word should be said regarding the various types available. For most purposes, the bivalve speculum is satisfactory. It is made in several sizes, and the examiner selects the size that can be introduced easily and does not cause the patient discomfort. In children, the most satisfactory speculum is the tubular cystoscope, which is used with the patient in the knee-chest position. The tubular speculum is available in various sizes. For some patients, the flat Sims speculum may be used to advantage.

Rapprochement with patient. Establishing the patient's confidence is the greatest single factor in promoting ease of examination. Unconsidered remarks or chance actions that engender fear, resentment, or anxiety may result in a tense, disturbed, or apprehensive patient. Such a patient is rigid and ill at ease and in a state that may make pelvic examination impossible or seriously unproductive. In creating confidence, gentleness is the first essential. Relaxation may be encouraged by asking the patient to breathe through her mouth. Constant reassurance is helpful. No violation of modesty should enter the pelvic examination, but exposure should be consistent with thoroughness. The presence of a nurse or an assistant may aid in this respect. Most of all, the physician should maintain an attitude of kindly and impersonal thoroughness. A pelvic examination is not a pleasant experience for any woman, and the success with which it is conducted depends as much on the attitude of the physician and his assistant as on the actual situation in the pelvic region.

What to look for. Inspection of the external genitalia is done with the patient in the lithotomy position and with the physician standing between the patient's knees. The vulva is inspected for dermal lesions, excessive secretions, and masses. Since vulvar neoplasms frequently metastasize to the inguinal lymph nodes, these nodes should be palpated for tenderness or enlargement. Small, shotty inguinal nodes are not unusual, especially in young women, and should cause no concern unless they are associated with definite lesions.

After examination of the vulva, the labia should be gently parted, and the size, shape, and dermal changes, if present, should be noted carefully. Inspection for kraurosis vulvae, lichen sclerosus et atrophicus, and leukoplakia should be made. Normally, Bartholin's glands should not be palpable, and Skene's glands should not be tender. If the hymen is intact, examination of the pelvic organs may be completed recto-abdominally. Careful note should be made of the caliber of the introitus. By pressure exerted downward against the perineal body during vaginal examination, more space may be obtained with less discomfort to the patient.

The condition of the pelvic floor is then determined. To ascertain the presence or absence of rectocele is not difficult but may be rendered easier by pressure exerted upward on the posterior vaginal wall through the rectum. The size, shape, consistency, and position of the cervix should then be determined by palpation. A normal cervix is said to have the consistency of the

end of the nose, whereas a cervix invaded by a malignant process generally has a hard or gritty consistency.

At this point, examination with the speculum is begun. It is well to recall that the axis of the vagina is directed posteriorly, while the long axis of the introitus is anteroposterior. It is desirable to introduce the bivalve type of speculum, with its transverse axis vertical to conform to the shape of the vaginal orifice. This is preceded by separating the vulva and applying pressure on the perineal body. When it is well past the entrance of the vagina, the speculum is turned so that the blades lie transversely, with the tip of the speculum pointed posteriorly toward the vaginal floor when the blades are opened. The common practice of using soap or lubricants is not advisable, since soap alters the chemical reaction of the vaginal secretions and interferes with staining and cultural reactions. Lubricants also frequently make interpretation of Papanicolaou stains for malignant cells more difficult or even impossible. Rather, it is better to wet the gloved hand and speculum with warm water, thereby decreasing the shock to the patient and offering adequate lubrication.

With the aid of a strong light, the cervix is now visualized directly. Its size, position, and length, as well as the nature of its secretions, are noted. This is the moment at which an old adage becomes most significant: "Examine the cervix with a strong light and with a suspicious mind." A smear for study by the Papanicolaou technic may be taken. Secretion should be taken from both the internal os and the vaginal pool. Samples may be obtained with either a wooden spatula or a cotton applicator. The secretion is spread on a clean glass slide which is dropped immediately into a solution of 95 per cent alcohol. Because of the danger of explosion, ether should not be added to the solution of alcohol stored about the office.

Next, the cervix is inspected for evidence of cystic change, lacerations, or erosions. A specimen of any abnormal tissue that is seen should be taken for biopsy before definitive therapy is offered. Such a specimen should always be obtained if cervical erosions are present, and care should be exercised to secure adequate tissue from the squamocolumnar junction. This should be done before cervical cautery is attempted. The application of Lugol's solution will demarcate those areas most applicable for biopsy.

Normal cervical and vaginal epithelium contains glycogen, whereas abnormal epithelium, such as that found in erosions or a malignant lesion, contains little or none at all. Hence, by

applying a weak solution of iodine (one-fourth strength tincture of iodine) to these areas, a marked differentiation may be obtained rapidly. Normal tissue becomes a deep mahogany brown and the pathologic surface turns pink. Specimens for biopsy should be taken from the pink or light areas. One must be cognizant of the fact that the Schiller or iodine test is not specific for any type of lesion, nor does it distinguish malignant from benign tissue. It merely demarcates the areas from which specimens of tissue for biopsy should be taken. There is no special time in the menstrual cycle when the specimen for biopsy should be obtained. In this regard, the endocervix should not be neglected, because the introduction of a small sound or cotton applicator within the cervical canal (the so-called Clark test) often discloses a pathologic process that otherwise might have been missed.

Many women present with bleeding after subtotal hysterectomy. Under such circumstances, a small endocervical curet may be used to obtain tissue for examination. If small endocervical polyps are the cause of the bleeding, this curettage may be therapeutic as well as diagnostic. It is always well to submit all such material to a competent pathologist for careful examination and evaluation.

It is also a wise practice to remove all polyps that may be found extruding from the cervix. Polyps can be removed easily by torsion. This procedure should be followed by fulguration of their bases. All polyps should be examined by a competent pathologist. Before the speculum is removed, the condition of the vaginal walls should be observed, with attention given to the presence or absence of excoriations or new growths.

The bimanual examination, which would better be known as the "vaginal-abdominal examination," can be made with fingers of either hand within the vagina. From a practical standpoint, especially if the physician practices obstetrics, it is useful to develop ambidexterity in this performance. With the examiner's fingers resting against the pelvic floor, the cervix is palpated, while the examiner's other hand is placed flat on the lower part of the patient's abdomen. By elevating the palm and using the tactile sense in the balls of the fingers rather than in the tips, the various organs are located, steadied, and evaluated. The size, shape, and consistency of each structure can be determined, and, if tumors project into the superior strait, their outlines can be noted.

After the cervix has been palpated, the presence or absence of pelvic pain on motion is de-

terminated. The position of the uterus is ascertained by locating the body of the organ. When the uterine fundus lies in its normal relationship, it is usually in an anteflexed position. Retrocession or retroflexion occurs normally in a high percentage of women. The mobility of the uterus may then be thoroughly tested. Immobility or excessive pain on uterine motion may be indicative of chronic infection, acute exacerbation of chronic infection, adhesions, or endometriosis. When the median part of the pelvis has been palpated and the condition of the uterus has been determined, the examining fingers are now slid into one of the fornices lateral to the uterus. The abdominal hand is directed in a like plane and is moved slowly and deliberately.

Next, the examiner's fingers in the vagina are pushed out into the lateral fornix, while the hand resting on the abdomen is directed in a like plane. The ovary is then palpated between the tips of the fingers of both hands. A normal ovary is sensitive and mobile. Ovaries that are retrocessed within the pelvis are best examined later by the recto-abdominal approach. The physician should become familiar with the normal size of an ovary and should keep in mind its tendency to enlarge after contralateral oophorectomy and hysterectomy. The normal ovary feels like an almond; it is about 4 cm. long and 2 to 3 cm. wide. Normally, it moves within a limited range. Occasionally, its mobility may become abnormal and it may be situated immediately lateral to the cervix, within the cul-de-sac, or high on the lateral pelvic wall.

Normal fallopian tubes usually cannot be palpated through the vagina. However, if they are thickened or are the sites of chronic residual changes from infection, they may be sensed as masses of hornlike shape which occasionally are fluctuant and many times are tender, firm, and resistant.

Rectal examination should be done for all patients who complain of difficulties referable to the pelvis, and it is especially indicated for young women with an intact hymen. When a pelvic malignant process is present, the recto-abdominal examination gives, perhaps, more information than any other. The necessity for an empty bowel is clear. Care should be taken not to exert too much pressure against the anterior wall of the bowel, for that structure may be extremely tender. Should abnormalities be noted, proctoscopic examination is indicated.

Lesions within the vagina and cervix occasionally may be seen best by examining the patient in the knee-chest position. The vagina is easily distended with air, making the vaginal rugae

disappear and allowing the walls of the vagina to be seen clearly. Children and young girls are best examined in this position and with the aid of a Kelly cystoscope.

At times, it may be necessary to anesthetize the patient in order to carry out pelvic examination. An anesthetic is indicated only after repeated pelvic examinations have been entirely unsuccessful, sometimes with several days intervening. One should be aware not only of the usefulness of this procedure but also of its limitations. Naturally, examination of the pelvis with the patient under anesthesia has no value when the cooperation of the patient is needed; for example, to locate sites of pain or minimal discomfort. In general, the more nearly complete and the more accurate the pelvic examination is, the less frequent is the need to resort to anesthesia in diagnosis.

VAGINITIS AND LEUKORRHEA

The conditions treated most often by the gynecologist in his office are vaginitis and leukorrhea. The word "leukorrhea" actually refers to any vaginal discharge. Usually, however, it implies an abnormal vaginal discharge. The most common types are *Trichomonas* vaginitis, *Monilia* vaginitis, nonspecific or *Hemophilus* vaginitis, and senile vaginitis.

Trichomonas vaginitis. This type of infection is found in all age groups and frequently occurs during pregnancy. In 20 to 25 per cent of the average gynecologic practice, it may be found easily and may be entirely asymptomatic. Actually, the causative agent is a stubborn protozoan invader with a characteristic large body about twice the size of a white blood cell. When viewed under high power, granules are seen within the cytoplasm and several flagella which whip around to make the parasite motile.

The clinical picture of *Trichomonas* vaginitis is characteristic. The mucosa of the vagina usually appears reddened and, when the condition is severe, presents an over-all red with strawberry patches. The color of the vagina, of course, depends upon the extent and severity of the infection. Usually, the infection is accompanied by a profuse, light-yellow discharge in which air bubbles are often entrapped, giving a characteristic frothy or bubbly appearance. The commonest subjective symptoms are vaginal discharge with itching and soreness and, not infrequently, dyspareunia. Frequently, the patient states that the condition became exaggerated after her menstrual period.

The diagnosis of *Trichomonas* vaginitis is made by examining a small amount of the dis-

charge on a plain glass slide to which may be added a few drops of physiologic saline solution and a coverslip. Under the microscope, an area showing evidence of movement is found under the low-power objective. The high power is then adjusted, and the motile organisms are readily discernible. If the light is subdued under the stage, the flagella may be noted whipping about nervously, and the amebalike pseudopods are observed when the trichomonads change in shape and size. The only other vaginal invaders that may confuse the picture are spermatozoa, but, if one has had the opportunity to compare them with the former at least once, the diagnosis will never be confused.

The treatment of *Trichomonas vaginitis* actually should be along three lines. The first is preventive, consisting of prophylactic measures. The patient should be taught the importance of washing her hands after a bowel movement and also before inserting vaginal tampons during menstruation. She should be instructed to wipe backward with toilet paper after defecation and not to employ the enema tip for vaginal douching. The basic aim of the second line of treatment is to restore and maintain the vaginal pH between 4.5 and 5 and to treat the patient during her menstrual period. Good results have been reported with many types of medication. My colleagues and I prefer initially to insufflate the vagina with a preparation of acetarsone (powdex Stovarsol compound). Each single-dose cartridge contains 7½ gr. of acetarsone. This drug is stabilized with a soothing nonirritating diluent of zinc oxide and salicylic acid compound. Besides restoring the proper pH of the vagina, the preparation has the added advantage of being hydroscopic. Even the most moist vagina and vulva will be dry the first night after it is used, and this in itself has a great psychologic advantage for the subsequent treatment that may be used. We install the first powdex treatment with the patient in the knee-chest position and generally use 2 single-dose cartridges for this treatment. We give the subsequent 5 daily doses with the patient in the usual lithotomy position without interruption between doses for douches or other medication. Sexual congress should be discontinued until the condition is improved. In pregnant patients, a speculum is employed during insufflation to prevent possible air embolism. Following treatment with this compound, the patient is instructed in the use of vaginal suppositories, consisting of a preparation of diodoquin (Floraquin). Upon completion of this form of therapy, she is re-examined after 3 menstrual periods. No method that I know is 100 per cent successful.

Monilia vaginitis. Mycotic vaginitis is a common cause of leukorrhea. It is found most frequently during pregnancy, in diabetic patients, and in patients recently treated with broad-spectrum antibiotics. Although other types of yeast may produce vaginitis, *Monilia*, such as *Candida albicans*, has been the most frequent invader. The vagina may be covered by whitish to grayish plaques that are adherent to the vaginal wall. The most common symptoms are itching, burning, vaginismus, dyspareunia, and, occasionally, frequency and urgency of urination.

The diagnosis is made in a manner similar to that in which *Trichomonas vaginitis* is diagnosed. A small portion of the discharge is placed on a slide with a drop or two of saline solution. In this, bamboo-like structures are found with segments, granules, and budding. Special strains are not necessary for the diagnosis. Often, trichomonads, as well as *Monilia* organisms, are found in the same smear.

Monilia infections most frequently respond to the use of nystatin (Mycostatin) vaginal suppositories. One of these is placed in the vagina in the morning and one at night for twelve days. Douches are not used during this period.

Nonspecific or Hemophilus vaginitis. The third type of vaginitis, which up to now has been called "nonspecific," probably is *Hemophilus vaginitis*, first reported by Leopold. The symptoms are less pronounced than in other types and seldom consist of more than moderate itching and burning. The leukorrhea resembles that of trichomoniasis but usually is gray in contrast to the yellow or white of trichomoniasis. There is a close correlation between *Hemophilus vaginalis* and epithelial cells with indefinite outlines and coarsely granular cytoplasm, as seen in wet preparations. These cells have been labeled "clue cells" and are considered practically diagnostic, though a similar cell is occasionally seen in vaginitis from other causes. A gram-stained smear of the discharge shows large numbers of the typical gram-negative pleomorphic bacilli. This organism resists culture, the most satisfactory medium to date being modified sheep's blood agar incubated in an atmosphere of increased carbon dioxide.

Treatment consists of local applications of a vaginal cream of triple sulfonamides or, more recently, a preparation of hexetidine (Sterisil vaginal sol). For *Hemophilus* infection of the male urethra, treatment with one of the tetracycline group of antibiotics has been suggested. Sterisil vaginal sol has been offered as a general therapeutic agent in the treatment of not only *Hemophilus vaginitis* but also *Trichomonas* and

Candida vaginitis. Initially, research interest was aroused in these compounds when it was demonstrated that they inhibit glycolysis and also adsorb on protein materials. Subsequent studies demonstrated that this series of compounds has an antibacterial spectrum similar to that of the broad-spectrum antibiotics. This drug has been found to be safe during pregnancy and for infants and children.

Senile vaginitis. This type of vaginitis usually occurs after the menopause but is occasionally seen after surgical treatment, irradiation, or pathologic destruction of the ovaries. These patients may complain of discharge, burning, dyspareunia or, occasionally, a bloody, serosanguineous leukorrhea. The etiology rests in the loss of estrogenic hormone with resultant atrophy and thinning of the vaginal mucosa. Loss of the protective layers of the vaginal epithelium leads to dryness and often to the formation of adhesive bands within the vagina. Inspection reveals that the mucosa is thin and atrophied and contains numerous areas that bleed easily on palpation. The entire vaginal orifice actually may be scarred down to one half of its normal size.

Treatment includes the use of vaginal suppositories containing 0.5 to 1 mg. of stilbestrol each, to be inserted nightly for two to four weeks before retiring. A cream of conjugated estrogenic substances (Premarin) has also been found effective.

NEW GROWTHS

New growths cannot be dissociated from cervicitis due to the various forms of vaginitis previously described and from cervical erosions associated with cervical changes of a benign nature, for, as Novak has said, despite statements in the textbooks, it is difficult to diagnose cancer from the gross appearance of the cervix. Some of the worst looking cervical lesions have proved to be benign, while others, appearing rather innocuous, have proved to be manifestations of early cancer. The moral, of course, is to take smears or biopsy specimens if there is even the slightest doubt, and one may paraphrase the statement by saying that ideally every female patient should have a Papanicolaou smear. If cancer is suspected clinically, however, even with negative cytologic findings, the condition should be investigated along traditional lines. At least 1 case in 150 of uterine cancer that would escape the most careful scrutiny in routine outpatient practice can be detected by the smear technic. Furthermore, this technic can be done in the earliest stage of the disease, when a very high percentage of permanent cures can be justifi-

ably expected. The need for advocating early diagnosis by balanced and efficient teamwork scarcely requires further emphasis. The method of collecting and fixing smears is simple enough to be suitable for use in the practitioner's office. The cytologic method plays a valuable role in raising suspicion of malignant processes and in encouraging close surveillance of the gynecologic patient with atypical cervical epithelium. Should this procedure become a routine in the office of every practicing physician, there is no telling what the over-all outcome would be, just as the ultimate favorable outcome of Papanicolaou's original work of forty years ago, which was concerned with the exfoliation of cells into the vagina of rodents, was unpredictable.

CHRONIC CERVICITIS

Since every case of chronic cervicitis is potentially a case of carcinoma of the cervix, early malignant disease of the cervix must be excluded first. As indicated previously, many benign-appearing cervical lesions may harbor precancerous changes. Should the Papanicolaou stain or smear and biopsy or conization prove that the chronic cervicitis is actually a benign condition, the cervix should be cauterized or treated otherwise. Electrocauterization or other methods of tissue destruction by heat applied immediately after biopsy may bring about changes in the tissue so that a repeat biopsy may be misleading. When the results of biopsy are negative but the lesion still appears suspicious, another biopsy specimen should be taken because the original specimen may not have been chosen from the proper site to show malignant change. Rather than use a cautery to stop the small bleeding points created by biopsy, my colleagues and I apply oxidized cellulose (Oxycel) or absorbable gelatin sponge (Gelfoam) plus an iodoform pack, which controls bleeding in almost all instances. When biopsy discloses chronic endocervicitis or cystic cervicitis, with no evidence of malignant change, then and only then do we proceed with treatment.

The active treatment of cervicitis consists of the use of simple electrocautery. Since the cervix is devoid of sensory fibers, or nearly so, the treatment is carried out in the office without the use of general or topical anesthesia. Should local anesthesia be found necessary, either 10 per cent solution of cocaine hydrochloride or Americaine solution may be found adequate. We prefer to cauterize the external cervix before the endocervical canal, since, generally, there is more cramping with the latter procedure. We use a radial cautery technic until all of the exter-

nal portion of the cervix up to and including the entire site of erosion has been covered. Then the endocervical canal is thoroughly cauterized. Besides a Sims speculum, we use a Piper vaginal retractor to keep the vaginal walls well away from the field of operation.

It is important to tell the patient what to expect after the cautery has been done. The insertion of Westhiazole vaginal suppositories or a cream of triple sulfonamides lessens the odorous discharge that may occur. The patient is instructed not to douche for ten days to two weeks after cauterization and is advised to abstain from sexual activities for approximately the same period. She is usually told that after ten days to two weeks, she will note a bloody, dark vaginal discharge irrespective of her menstrual period. However, should the menstrual period occur in the ten-day to two-week interval, the flow is often unusually heavy, and rest in bed is advised during this time. All patients are encouraged to report for re-examination two to three weeks after the initial cautery and again after three to six months. Patients who have undergone deep cautery should be observed carefully for cervical stenosis, and, before dismissal, the cervical canal should be probed. Occasionally, after deep cervical cautery, it is necessary to use graduated Hegar dilators to insure proper patency of the cervical os or cervical canal.

FUNCTIONAL BLEEDING

Functional bleeding, as the name implies, means hemorrhage from the uterus in which there are no neoplastic or inflammatory lesions. It is important to learn early whether the disturbance is functional and, hence, whether the uterine bleeding is originating from a proliferative or a secretory type of endometrium. The necessary tissue may be obtained satisfactorily in the office in practically all cases without anesthesia. The Randall cannula curet is used for this purpose. The caliber of the instrument is 4 mm., and it can be introduced consistently into the uterine cavity without previous dilatation. The cutting edge of the cannula protrudes but little beyond the periphery of the tube and allows removal of the curet from the uterus with ease.

The actual technic used to remove tissue is simple. The cervix and cervical canal are usually prepared with an antiseptic, and the tip of the cannula curet is carried to the fundus of the uterus. Firm pressure is placed against the uterine wall, and then steady downward traction is applied to the external os. Without removing the instrument, the tip should again be carried to the fundus and the procedure repeated in an-

other area. On withdrawal of the curet, the specimens are found in the lumen of the instrument, and they can be immediately expelled into a fixing solution or, sometimes more conveniently, onto thick blotting paper which is then immersed into the solution. The blotting paper saves time for the pathologist later on. This procedure allows study of a considerable area of endometrium. Correlation of information obtained from microscopic study of tissue removed, on the one hand, and from the clinical history, physical examination, and estimation of the basal metabolic rate, urinary estrin, and pituitary gonadotrophin, on the other hand, have increased the accuracy of diagnosis in cases of functional bleeding. Use of the Randall curet is not advocated in patients in whom a carcinoma of the endometrium is suspected. It is better in such patients to resort to cervical dilatation and uterine curettage.

DYSMENORRHEA

Dysmenorrhea does not seem to plague the gynecologist as much as it did years ago. However, the various forms of treatment still are multiple and many times complex. The pain in both primary and secondary forms of the condition is most variable and may range from mere discomfort to severe agonizing pain in which the patient may require hypodermic injections of narcotics. Secondary or acquired dysmenorrhea is the type that usually responds well to treatment.

Examination of the patient should begin with a complete physical appraisal and routine laboratory tests, including determination of the basal metabolic rate and the sedimentation rate. The psychogenic background should be analyzed carefully. Among the common causes of secondary dysmenorrhea is pelvic inflammatory disease. Today, this may be present as a result of infections from organisms other than the gonococcus. Heat therapy and short-wave diathermy plus antibiotic therapy alleviate the dysmenorrhea that is on an inflammatory basis. Endometriosis is often suspected from the history.

Treatment in young girls should be conservative with the thought of preserving the child-bearing function. Many of these patients respond to the use of testosterone, estrogen, or a combination of both. In more advanced cases of endometriosis in which conservatism would be ineffectual, surgical therapy must be used. Under such conditions, the child-bearing organs should be preserved in so far as possible. In older patients in whom the child-bearing function may be sacrificed if necessary, the pelvis, including both ovaries, should be cleaned out. In the younger patients who are treated surgically, my col-

leagues and I prefer to do presacral neurectomy.

Primary dysmenorrhea is still the enigma of the gynecologist, but most of the cases fit into psychogenic, constitutional, local, or endocrine categories. The treatment, of course, depends upon the cause, which may be found from the history to be a purely psychoneurotic one. A low basal metabolic rate or general debility should be corrected. When no specific cause is found, various analgesics, such as aspirin, Phenacetin, combinations of aspirin, Phenacetin and caffeine, or codeine should be tried. In cases of primary dysmenorrhea that do not have a specific cause, exercises have occasionally given much relief by diverting the patient's mind and increasing circulation.

Endocrine therapy is not specific and does not result in permanent cure. In many cases, however, estrogens or androgens are administered for two to three months at a time to suppress ovulation and relieve pain.

It should be mentioned parenthetically that menstrual distress usually represents a combination of complaints, including periodic tension, recurrent edema, uterine colic, and mastodynia. Psychotherapy aimed at improving the patient's insight into the influence of emotions on physical symptoms should be given over a long period of time. To help relieve the hidden tissue edema, acetazolamide (Diamox) or aminometradine (Mictine) may be prescribed for the week preceding the menstrual period. It is also suggested that the patient take a low-sodium diet. This regimen often relieves cyclic mammary pain as well as headaches. The patient should also be instructed to limit her fluid intake the week preceding her menstrual period. Ammonium chloride therapy has done much to call attention to the theory of hidden edema, and, when used, it should be started at least fourteen days before the anticipated menstrual period.

The philosophy underlying the treatment of dysmenorrhea is first of all that one should do no harm. It is irrational to initiate a form of therapy, the repercussions of which may be worse than the dysfunction. Analgesics of the opium series and some of the newer synthetic

drugs, such as alphaprodine (Nisentil) or meperidine (Demerol), are habit forming and should not be used routinely or repeatedly. The emotional component of dysmenorrhea has long been recognized, and, certainly, suggestion enters into any cure. Regardless of the cause of essential dysmenorrhea, some measures seem to provide partial relief, such as cervical dilatation and uterine curettage, use of a stem pessary for various periods, pregnancy, and presacral neurectomy.

SEXUAL FRIGIDITY

Complaints of sexual frigidity or sexual incompatibility are heard often. Clinically, of course, such conditions have many facets and lead to strange symptoms and signs which may conceal the real problem. It is not surprising that these complaints are frequent, since ignorance and false information have long been the bugaboo in the sexual life of the female. Many mothers still tell their daughters that sexual relations are degrading, improper, or dangerous. Such teaching, of course, leaves a permanent stigma on the mind of the young girl, which greatly influences her sexual behavior in adulthood. It is not unexpected, then, that some women develop and retain a feeling of repulsion or disgust toward sexual activity. Of course, not all frigidity is due to psychogenic reasons. The majority of women possess the capacity for pleasurable sexual activity. It is important that a wife should be completely satisfied sexually, for only then does she become relaxed and productive in other activities. In order to advise her properly, the physician himself must be aware of, and believe in, the importance of good sexual adjustment and its place in the attainment of good emotional health. He should not have any prejudices concerning sexual behavior, for, unless he is tolerant and understanding, he will be unable to use the psychosomatic approach. Many times, sympathetic understanding of the patient in the course of several visits is of great value in eliminating unhealthy manifestations. Patients with deep-seated neuroses and psychotic tendencies should be referred to a psychiatrist.

Intermittent Obstructive Jaundice in Hodgkin's Disease:

Report of a Case

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JAUNDICE is not uncommon in patients who have Hodgkin's disease. It has been reported to occur in 3 to 6 per cent of cases,^{1,2} and some observers think it occurs even more frequently, since mild jaundice is overlooked at times or not reported. However, jaundice developed in the greatest number of the reported cases during the terminal phase of the illness. The incidence of intermittent jaundice in Hodgkin's disease is unknown, but it is thought to occur infrequently.

We are reporting the case of a patient who had Hodgkin's disease with intermittent jaundice in whom the condition responded to treatment with nitrogen mustard during 4 episodes of jaundice in a period of two and one-half years. It is well recognized that nitrogen mustard has a place in the treatment of Hodgkin's disease, but its use in the presence of jaundice has been limited. Dameshek and associates³ expressed the opinion that the presence of jaundice in Hodgkin's disease is a contraindication to the use of nitrogen mustard.

CASE REPORT

A 57-year-old white man, a pharmacist, was first seen at the Mayo Clinic in January 1950. He complained of progressive weakness, easy fatigability, backache, and loss of 25 lb. during the past year. For nine months he had noted abdominal fullness, bloating, and periumbilical distress after eating solid foods.

Examination disclosed that the liver was palpable 2 fingerbreadths below the right costal margin. The tip of the spleen was palpable. Multiple small, firm lymph nodes were felt in the left axilla and right groin.

Urinalysis showed albumin graded 1 to 2 (on the basis of 1 to 4), with positive results of tests for Bence Jones protein; grade 1 erythrocytes and grade 3 pus cells were present. The value for hemoglobin was 10.2 gm. per 100 cc. of blood. Erythrocytes numbered 4,070,000 per cubic millimeter of blood. The leukocyte count was 24,800, with a differential count of 6 per cent lympho-

cytes, 4.5 per cent monocytes, and 89.5 per cent neutrophils. The erythrocytic sedimentation rate was 96 mm. during the first hour (Westergren method). Roentgenograms of the thorax, lumbar portion of the spinal column, and the gallbladder showed nothing abnormal. The values for urea clearance and for blood urea, calcium, phosphate, amylase, lipase, and alkaline phosphatase were normal.

Biopsy of lymph nodes disclosed Hodgkin's type of lymphoblastoma. Bacteriologic studies on the nodes showed no growth. Roentgen treatment was given over the abdomen, thorax, and back, but this therapy was interrupted after 14 treatments because of leukopenia.

The patient returned five weeks later to complete his course of roentgen therapy. He was feeling much improved and had gained 13 lb. The leukocyte count was normal, and the course of radiation therapy was completed without incident. The patient was dismissed in April 1950.

He returned to the clinic for checkups in July 1950 and April 1951. He had no complaints at these times, and significant abnormalities were not found. Treatment was not given on either occasion.

In September 1951, the patient returned because of fluctuating painless jaundice without fever. Occasional dark urine and clay-colored stools had occurred during the previous five weeks. Definite jaundice had been present for nine days. Pruritus had appeared about three days before admission.

The liver was firm, smooth, and palpable 2 fingerbreadths below the right costal margin. Results of routine hematologic studies were normal. Urinalysis showed grade 2 albumin and grade 1 bile. The value for direct-reacting serum bilirubin was 8.2 mg. per 100 cc., and the indirect-reacting type measured 1.8 mg. Thoracic roentgenograms showed nothing abnormal.

The patient was admitted to the hospital for a trial of nitrogen mustard with the provisional diagnosis of obstructive jaundice related to Hodgkin's disease. A total of 27 mg. of nitrogen mustard was given intravenously in 2 doses; four days later, the direct serum bilirubin had decreased to 2.74 mg. and the indirect was 1.7 mg. Two days later, the values were 2.5 and 0.5 mg., respectively. The patient felt greatly improved and returned home.

The patient returned in May 1952 because fluctuating jaundice had recurred six weeks previously. He had been free of jaundice since the aforementioned treatment with nitrogen mustard. He felt well in the interval and had continued to work. At the onset of this episode of jaundice, he treated himself with bile salts, choline, and saline cathartics, with some improvement. However, when this

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self-medication was discontinued, the jaundice increased, so he resumed medication and the jaundice became less severe.

Results of examination were not remarkable except for the mild jaundice. Serum bilirubin measured 1.37 mg. direct and 0.75 mg. indirect. Bile was not found in the urine. Values for serum protein, the albumin-globulin ratio, hemoglobin, erythrocytes, leukocytes, platelets, prothrombin time, and alkaline phosphatase were normal. The differential count showed 11.5 per cent lymphocytes, 14 per cent monocytes, 72 per cent neutrophils, and 2.5 per cent eosinophils. Results of a thymol turbidity test and roentgenologic studies of the thorax were normal. Cholecystography was attempted but no function was demonstrated.

The patient was given 27.5 mg. of nitrogen mustard intravenously. The serum bilirubin showed no appreciable change five days later, and surgical exploration of the abdomen was advised. However, the patient decided to return home and to postpone surgical treatment, as he felt improved.

The patient returned in November 1953. The jaundice again had cleared completely after the use of nitrogen mustard in May 1952, but it had recurred in February 1953. A surgeon in his community had explored the abdomen at that time and found a stricture of the common bile duct and scarring in the duodenum. Cholecystostomy was done. Several small stones were removed from the gallbladder, but none were found in the common bile duct. T-tube drainage was instituted, and the jaundice cleared rapidly. The surgeon found no significant intra-abdominal nodes or masses. External biliary drainage was continued until June 1953. The patient had lost 30 lb. in weight since the operation and had noted progressive weakness. Jaundice had recurred three weeks prior to this visit to the clinic, and he had experienced retention vomiting during this period.

The liver was palpable 4 fingerbreadths below the right costal margin, and the spleen was palpable. The patient looked chronically ill and was extremely weak. The value for hemoglobin was 11.3 gm.; erythrocytes numbered 3,250,000; and the leukocyte count was 4,900. The sedimentation rate was 92 mm. The serum bilirubin measured 8.2 mg. direct and 1.0 mg. indirect. The value for alkaline phosphatase was 86.2 King-Armstrong units. Results of other blood-chemical studies and of various roentgenologic studies were normal.

Use of nitrogen mustard again was advised, and a total of 24 mg. was given intravenously. Subjectively, the patient felt greatly improved in twenty-four hours. Three days after treatment, the serum bilirubin had decreased to 2.69 mg. direct and 0.81 mg. indirect. The patient returned home and reported that the jaundice cleared completely, only to recur late in January 1954. Nitrogen mustard was given elsewhere, and the jaundice again cleared and did not recur.

The patient returned for the last time in October 1954. During the previous three or four months, he had experienced increasing anorexia, fullness in the abdomen, vague abdominal distress, increasing weakness, nausea, and occasional vomiting. He was ambulatory but was pale, weak, and ill. A large, firm mass was palpable in the epigastrium and right upper quadrant of the abdomen. The edge of the spleen was palpable on deep inspiration. Ascites and edema of both lower extremities were present.

The value for hemoglobin was 10.8 gm. Erythrocytes numbered 3,320,000, and the leukocyte count was 9,100. The differential count showed 2 per cent lymphocytes,

12 per cent monocytes, 85.5 per cent neutrophils, and 0.5 per cent eosinophils. Study of blood smears showed increased rouleaux. The sedimentation rate was 65 mm. Total serum proteins measured 3.48 gm. per 100 cc., with 1.98 gm. of albumin and 1.5 gm. of globulin. A test of hepatic function using sulfobromophthalein showed grade 1 (10 per cent) retention of dye in one hour. The values for blood urea and serum bilirubin were normal. Thoracic roentgenograms showed fluid in both costophrenic angles. Roentgenologic studies of the esophagus, stomach, and duodenum showed an epigastric mass displacing the lesser curvature of the stomach, but intrinsic involvement of the stomach, duodenum, or esophagus was not noted.

The patient received 2 blood transfusions of 500 cc. each. Roentgen therapy over the entire abdomen was given for six days. He improved, and, at the time of dismissal, was eating well. One week later, he vomited bright-red blood and passed tarry stools. He was hospitalized at home and the hematemesis continued. He was given supportive blood transfusions, and, on November 1, 1954, abdominal exploration was done by his home surgeon, who found a bleeding gastric ulcer and did a partial gastric resection. Histologic study of the gastric wall disclosed Hodgkin's disease. Hepatic biopsy done at the same time showed diffuse fibrosis.

The patient's condition became continually worse, with progressive anorexia and loss of weight. He died in February 1955. Necropsy was not done.

COMMENT

It is difficult to be sure of the pathophysiologic changes that produce jaundice in patients who have Hodgkin's disease. Multiple factors must be considered. It is important, of course, to rule out the usual causes of jaundice that are not related directly to Hodgkin's disease. Homologous serum hepatitis resulting from previous parenteral injections or transfusions and symptomatic hemolytic anemia,⁴ such as that occurring in other malignant diseases, may be responsible for jaundice in these patients.

Hepatic involvement occurs in about half of the patients who have Hodgkin's disease,⁵ but extensive changes in the liver are not common. Beatty⁶ found widespread hepatic necrosis in patients with Hodgkin's sarcoma only when jaundice had been present; necrosis of the liver was absent in Hodgkin's disease not associated with jaundice. However, the group of patients studied was small, and the hepatic necrosis may have been related to treatment rather than to the presence of Hodgkin's disease.

Obstructive jaundice caused by Hodgkin's disease may occur. This diagnosis is made by excluding the commoner causes of obstructive jaundice, as was done in the case just reported. Hodgkin's disease can produce obstructive jaundice primarily by 3 methods: namely, (1) compression of the main biliary ducts by adjacent tumor or involved nodes, (2) obliteration of the main extrahepatic ducts as the result of ductal

involvement by Hodgkin's granuloma, and (3) involvement of the intrahepatic ducts. Compression of the common bile duct by enlarged peribiliary nodes involved by the granulomatous process is probably the most common explanation given and is the assumed mechanism of jaundice in many reports in the literature. Examination at necropsy or surgical exploration frequently fails to bear out this explanation. The case report by Pepper⁷ is illustrative of this point. The clinical diagnosis was obstruction of the common bile duct by nodes involved by Hodgkin's disease. However, the surgeon was unable to find any nodes that obstructed extrahepatic biliary drainage, and the cause of the jaundice was not ascertained.

Beatty⁶ recently reported the necropsy findings in 23 cases of Hodgkin's disease in which jaundice was present at the time of death. In only 2 of these was the jaundice thought to be caused by extrahepatic obstruction, namely, by para-choledochal lymph nodes in 1 case and by obstruction at the porta hepatis in the other. However, microscopic evidence of extrahepatic obstruction was not present in any of these cases. Beatty found diffuse involvement of the portal trinites by fibrotic Hodgkin's disease in the patients who were jaundiced, whereas the patients who had hepatic involvement but who were not jaundiced failed to show such involvement of the portal trinites. Jackson and Parker⁸ reported that jaundice caused by compression of the bile ducts by surrounding granulomatous tissue is rare. Barron's⁹ study of necropsy material showed that peribiliary infiltration produced jaundice more frequently than did pressure by enlarged nodes or masses against the large ducts. Thus, obstructive jaundice in Hodgkin's disease is caused most frequently by intrahepatic involvement, less often by direct involvement of biliary ducts, and only rarely by compression of extrahepatic ducts by tumor or involved nodes.

Surgical exploration of our patient, while he was jaundiced in February 1953, failed to reveal any nodes or masses compressing the large bile ducts. A stricture of the common duct was reported, which suggests that the common duct was involved directly by tumor. External biliary drainage at that time promptly relieved the jaundice, so intrahepatic involvement probably was not a factor in the jaundice. Unfortunately, the extent of hepatic involvement never was determined in this patient.

The effect of nitrogen mustard on tissue affected by Hodgkin's disease is not well known because of lack of suitable material for study at proper intervals before and after treatment. The

histologic studies of Spitz¹⁰ showed that prominent changes occurred within seven days after treatment in the 2 cases of Hodgkin's disease she studied before and at suitable intervals after treatment with nitrogen mustard. She noted no specific changes in the hepatic cells as the result of use of nitrogen mustard.

In studies on rabbits into which mustard gas containing radioactive sulfur was injected, Boursnell and associates¹¹ noted that the kidneys, liver, and lungs were the main excretory organs for nitrogen mustard. Large quantities of this material were found in the bile and urine during the first hour of collection after injection. If great amounts of nitrogen mustard are excreted in the bile by way of the liver in human beings, damage to hepatic cells may well occur.

Necrosis of hepatic cells has been reported in patients with Hodgkin's disease who received nitrogen mustard.^{3,6} However, not all of the cases in which hepatic necrosis has been found at necropsy are reported in detail, so it is impossible to know whether nitrogen mustard was given in all cases and if, when given, it was responsible for the necrosis.

Dameshek and associates³ reported 4 cases of patients who had Hodgkin's disease with hepatomegaly and jaundice to whom nitrogen mustard was administered. Response to treatment was good in 2, but the condition in the other 2 became worse. Only 1 of these cases is reported in detail; the patient concerned did not have obstructive jaundice and was critically ill when treatment was undertaken. In their group of 50 patients to whom nitrogen mustard was given, Dameshek and associates reported hepatic necrosis at necropsy in 3. It was considered likely that the necrosis could be attributed to the nitrogen mustard.

It is apparent that the causes of jaundice in Hodgkin's disease are so many and so varied that the jaundice alone cannot be the determining factor in the use or contraindication to the use of nitrogen mustard. A trial of treatment with nitrogen mustard appears worthwhile for those patients who have Hodgkin's disease associated with jaundice, particularly if the jaundice is of the obstructive type.

SUMMARY

A report has been given of a case of a patient with Hodgkin's disease in whom intermittent obstructive jaundice developed. The jaundice was relieved on 4 occasions by use of nitrogen mustard. The successful administration of nitrogen mustard in this case lends support to the opinion that the presence of jaundice does not

contraindicate use of nitrogen mustard in Hodgkin's disease.

The current concepts of the mechanisms responsible for the production of jaundice in Hodgkin's disease are reviewed. It is emphasized that

intrahepatic involvement or direct involvement of the main bile duct in Hodgkin's disease is more likely to cause obstructive jaundice than is pressure or compression of the extrahepatic bile ducts by enlarged peribiliary nodes or tumor.

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THE INCIDENCE OF GANGRENE in diabetic persons is related to infection but not to insulin requirement or known duration of diabetes.

Gangrene is sometimes the presenting symptom with diabetes. Probably, a long period of undiagnosed, slight diabetes precedes this manifestation.

Gangrene is often fatal. In some patients, some other manifestation of generalized atherosclerosis is the immediate cause of death and gangrene is contributory. Occasionally, patients die of an unrelated disease.

Survival after amputation is longer with diabetic than with nondiabetic gangrene, since vascular obstruction is less severe in the former group.

Advanced hyalinization of the juxtaglomerular segment of the afferent renal arterioles probably indicates diabetes or a prediabetic state. This condition is 13 times as frequent in diabetic as in nondiabetic patients. Intracapillary glomerulosclerosis, not observed in nondiabetic persons, appears in 48 per cent of diabetic patients.

Atherosclerotic gangrene is 53 times as frequent in diabetic as in nondiabetic men over 40 years of age and 71 times as frequent in diabetic as in nondiabetic women of the same age. In men under 80 years of age, two-thirds of all instances of atherosclerotic gangrene are associated with diabetes. In women, approximately 80 per cent of atherosclerotic gangrene results from diabetes.

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Immediate Planning for Definitive Treatment of Severely Injured Individuals with Multiple Fractures

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IT OCCURED TO US approximately a year ago, when caring for a patient with multiple injuries incurred as a result of a violent accident, that we were using the same general plan of treatment that we had used for well over three decades. This plan consisted of four parts:

1. First aid.
2. General examination and planning for definitive treatment.
3. The use of consultants.
4. The general management, supervision, total handling of the case by one man.

It further occurred to us that a plan to have been followed for so many years must have had some merit, for, judging by the survival rate of such victims and the percentage of those restored to full function, the modern medicine of the middle "20's," when compared to present knowledge, was as immature as medicine of the middle "90's" was to medicine of the middle "20's."

Bear in mind while reading this paper that the author is an orthopedist and that the title is not entirely accurate in stressing multiple fractures, as there has been gross insult to many of the soft tissues in accidents of violence. The survival of the victim and his restoration to function may depend on the recognition and treatment of these injuries, as well as treatment of the fractures. The victim of today has the additional advantages of:

1. Rapid communication.
2. Rapid transportation.
3. Organized and well equipped emergency rooms in hospitals with complete equipment.
4. Increased medical knowledge, including specialization.
5. Modern and present day teamwork within the medical profession.

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Before presenting the plan used today, let us visualize the victim with multiple serious injuries caused by an automobile accident, the most common accident of violence in this era. The police officer arrives shortly after the accident and directs the first aid in addition to his other duties, using his short-wave radio to call an ambulance and, on its arrival, he figuratively heaves a sigh of relief and turns the patient over to the care of attendants for possible additional first-aid treatment. The purpose, as in all first aid, is "to prevent further injury." The victim is transported rapidly to an emergency room of the nearest hospital, where a "glorified" type of first aid can be practiced because of the organization and equipment. We use the term "glorified" because all supplies and hospital services are available. As soon as possible, ambulance attendants and emergency room personnel place the victim on a wheeled cart on which he may be treated for many hours or transported to other parts of the hospital without gross handling. At this time, the patient is given a complete, rapid, general examination for total evaluation, and a working diagnosis can be adequately accomplished and additional special services available in the hospital can be called upon. In making this evaluation, we have found it useful to examine the various bodily systems, consisting of the nervous, cardiovascular, upper respiratory, musculoskeletal, and the genitourinary systems, in order to determine which has been subject to the greatest trauma and the effect upon the other systems.

The plan used today has the same principal parts as it did originally.

1. Under the auspices of the county medical society, a parent organization of all medicine in the community, with the aid of the Red Cross, regular first-aid instruction is given preferably by a doctor as an instructor to: (a) all police officers and (b) owners, operators, and attendants of ambulances.

The latter, by virtue of their occupation, care for more victims than does a single police officer.

2. *Emergency room.* Again, under auspices of the county medical society, the staffs of the various hospitals are made responsible for the organization and equipment of their emergency rooms and hospitals.

a. Glorified first aid.

b. General examination, evaluation, and planning for definitive treatment of the victim.

Here, it should again be pointed out that with the victim on a wheeled cart, not only the examination but many forms of treatment can be accomplished. Also, when the patient is to be moved to another part of the hospital, he will not require further gross handling, and, if he is to go to his room, arrangements can be made for certain equipment to be present on his arrival. If he is to be transferred to an operating room, personnel and equipment can be made ready, converting the emergency operating room procedure to a planned procedure.

3. *Consultants.* The part played by consultants in medicine of today does not require explanation, which leads us to a discussion of consultants employed by the physician or surgeon in charge and their possible abuse of the victim. In most instances, after the physician or surgeon in charge chooses a consultant, he must then decide how soon he should see the patient. Ordinarily, a physician's general knowledge enables him to administer the preventive and early treatment, but, in some instances, it is best to telephone the consultant, giving him a general picture of the case, asking him for suggestions for immediate treatment, and arranging for him to see the patient. Certainly, in all requests for consultants on accident cases, the man in charge should be the one to present to them the over-all picture. The patient may suffer abuse at any time after the consultants' arrival, since nothing

confuses any emergency room crew to the detriment of the victim's welfare more than an examination and orders given by one or more consultants at the same time. Furthermore, even after the critical period and later, multiplicity of orders continues to confuse the personnel and is detrimental to the patient's welfare.

4. *General management and supervision by one physician or surgeon.* At this point, we have admitted a very definite need for consultants, but all of us who limit our practice to one field of medicine are apt to have a common failing of "tunnel-vision," and, as a result, easily forget momentarily the patient as a whole. For that reason, one physician should supervise the orders so that they can be timed properly and allow the victim the physiologic rest necessary for his recovery without neglecting any particular injury. This is more easily arranged if the same team always works together, but any team can accomplish the same objective by using the telephone and considering suggestions made by the several consultants.

The past medical history and general condition of the patient just prior to the accident are quite as important in an accident case as in any other seriously ill individual, and this information can be gradually acquired from friends, relatives, and the patient. The cause of the accident and its degree of violence must also be considered and can be gained in part from the police officers, ambulance attendants, others in the accident, and witnesses, as well as, possibly, the patient.

Presentation of this paper was concluded by the use of a double screen, and, for each case on one side of the screen not discussed, the complications, and list of consultants, the slide gave a brief history, the multiple diagnoses, the past medical history, while, on the other side, multiple plates were used to illustrate interesting orthopedic problems brought out by these cases.

The Medicinal Treatment of Asthma

J. HARVEY BLACK, M.D.

Dallas, Texas

ALL PHYSICIANS regardless of the field of medicine in which they practice, have occasion, at one time or another, to meet the pressing problem of offering relief to someone suffering from severe asthma and for whom help is urgently needed. I should like to offer some suggestions which may be of help under those circumstances.

There are many medicinal agents available. Some are much more effective than others; some act more rapidly than others; some have fewer contraindications than others; and some should not be used at all. Let us run rapidly over the list.

For the sake of emphasis let me say first that *opiates* should not be used in any form. In my own experience, I have seen as many deaths occur from the use of an opiate in the treatment of the asthmatic paroxysm as I have from the asthmatic attack itself. There is some argument as to the mechanism that causes death but none concerning the fact that it occurs. Many patients can tolerate an opiate well, but its continued use in asthmatic patients sooner or later results in death. This interdiction applies to all opium derivatives. If an opiate is given, an ampule of Nalline should be on hand, and the patient should not be left alone unless someone is available to administer it in case of necessity. On two occasions, in the hands of my associate, Nalline has been lifesaving.

The *steroids* have been much in the public eye and have come into general, even indiscriminate, use. They are used much more often, I think, than is desirable. They usually relieve attacks of asthma which fail to respond to the usual measures, and, consequently, they can be of great help in such difficult situations. But, the steroids or ACTH do not bring relief as rapidly as epinephrine and should not be used unless and until the latter has been tried and failed. To my mind, long continued use of any steroid for the treatment of asthma is not justified unless all other measures have failed. I believe the steroids are only helpful as emergency medications. There are exceptions, of course, to this rule but they

should be few. We have seen a few patients with constant asthma that was resistant to all conventional means of relief who could be kept alive and in comparative comfort with daily doses of a steroid. Under these circumstances, we feel that the continued use of these agents is justified.

Epinephrine is still the most valuable drug for the treatment of asthma. Its action is rapid and, in most instances, effective. Its side effects are of little importance. Continued use does not lead to addiction nor does it damage the cardiovascular system. It may be used both as a watery solution and a suspension in oil. In oil, the action is more prolonged but also slower in its onset so that a choice should depend upon whether long protection or rapid relief is most needed. Often, unnecessarily large doses are given, resulting in pallor, tachycardia, and tremor. I am convinced that 0.5 cc. is fully as effective as a larger dose. Except in grave emergencies, intravenous epinephrine is not indicated. If the need should arise, it may be instilled into the vein a drop at a time or, better, diluted by saline or glucose solution. One should be prepared for the fact that even a single undiluted drop into a vein may precipitate a violent, occipital headache.

Epinephrine in oil is supposed to be absorbed over a much longer period than the watery solution, but it should be remembered that it is a suspension in oil and, sometimes, is absorbed more rapidly than is expected or desired. Since the dosage employed is usually twice the amount of the drug in solution, symptoms of overdosage may occur, consisting of pallor, tachycardia, and tremor.

The use of epinephrine by inhalation is helpful in the patient having recurrent, mild attacks. It does not control severe attacks, as do hypodermic injections, but for those less severe, it is quite convenient and can be used promptly in the beginning of an attack. This is important, for, with epinephrine as with other forms of medication, an asthmatic attack can best be controlled by the earliest possible medication.

Norepinephrine (Arterenol) also is produced by the adrenal medulla. It, too, is a vasoconstrictor with little or no effect on cardiac output and little hyperglycemic action. Commercial epine-

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phrine contains approximately 15 per cent norepinephrine. It is effective in the relief of asthma. Isopropylarterenol is available as Isuprel, which may be used by inhalation and sublingually and as Norisodrine, which is used as an inhalant powder. In a considerable number of patients, these agents produce so much cardiac stimulation that patients refuse to continue their use. In those who do not suffer these effects, they may be effective but seldom provide as much relief as does epinephrine when it is administered hypodermically.

Ephedrine has been used for the past thirty years. It has advantages over epinephrine in that it may be used orally, as a preventive, and its action is much more prolonged. Its disadvantages are that it is less potent and that central stimulation often so disturbs the patient that it cannot be used. It may be used orally, subcutaneously, or rectally, alone or, more frequently, in combination with other drugs. Recepthedrine, which is racemic ephedrine, is not as effective as 1-ephedrine, but it does not produce as much central stimulation and often can be used when 1-ephedrine cannot. To retain the effectiveness of ephedrine and avoid its side effects, many synthetic substances have been made, such as Neo-Synephrine, Propadrine, Nethamine and others, all of which are less likely to disturb the patient but also are less effective.

The *xanthine* compounds are quite helpful. Even a cup of hot coffee may give much relief, though whether this is due to the heat or caffeine is questionable. Theophylline and aminophylline are in quite general use. They may be administered orally, rectally, or intravenously. When injected into the muscle, they cause such severe pain that, in my opinion, they should never be so used. Even a little leakage from an intravenous injection is very painful and should be carefully avoided. A rectal suppository sometimes is almost as effective as an intravenous injection. The intravenous injection of as much as 0.5 gm. often relieves attacks that are resistant to epinephrine. Some severe reactions and a few deaths have been reported from the intravenous use of aminophylline, but I have not seen one. Very slow injection, taking at least five minutes for the introduction of 0.5 gm., has not produced any reactions in our experience. Enteric-coated tablets taken at bedtime often protect patients through the latter part of the night, which is the time when an asthmatic attack usually occurs. The uncoated tablet or the suppository taken at bedtime does not remain effective until the early morning hours, which is the time when protection is needed most.

Potassium iodide, an old and valuable remedy, is not of service in the relief of the immediate asthmatic attack but, over a period of days, may produce a more liquid sputum and, by lessening the severity of the cough, it prevents the development of severe dyspnea.

Recently *trypsin* and *Alevaire* (a detergent compound) have been used by inhalation and seem to be helpful in the presence of much tenacious mucus. Personally, I still wonder if they are much more effective than the iodide. Incidentally, since the iodide is absorbed so rapidly when given by mouth that it is detected in the saliva in thirty minutes, intravenous injections are seldom needed. It should be kept in mind that sooner or later an acneiform eruption or gastric distress may develop in some patients from the iodide. Rarely, a parotid swelling or edema of the nasal mucosa with rhinorrhea develops.

Glucose and water are lost rapidly in a severe asthmatic attack and should be replaced. Probably nothing helps a patient in status asthmaticus more than a considerable amount of glucose and water. If he is able to swallow and to retain fluid, it may be given by mouth, and corn syrup may be used. Sweetened fruit juices given frequently can be used to advantage.

I am convinced that *oxygen* is not needed in the treatment of asthma as often as it is used. If the patient is in status asthmaticus and is cyanotic, oxygen may be helpful. It should be remembered that in the acute attack, the patient's difficulty is not due to the lack of oxygen in the respired air but to the narrowed tube through which he tries to breathe. If the lumen of the tube can be increased by medication, he usually has no difficulty in acquiring as much oxygen as he needs. In instances in which medication is not producing the desired result and cyanosis has ensued, oxygen may be helpful. Even in such cases, it should be watched carefully if it is continued for some time, since it is not without danger. These patients may show hypoxemia and an increased $p\text{CO}_2$ and lowered pH. With the loss of the drive for respiration due to the hypoxia and a possible loss of sensitivity of the medullary centers for $p\text{CO}_2$, respiratory failure may occur. Continuous administration may cause pulmonary irritation, stupor, coma, and convulsions.

The *antihistaminic* drugs are seldom of much help in an asthmatic attack. Why they should be helpful in the treatment of hay fever and of relatively little value in asthma, we do not know. That this is not generally recognized is shown by the fact that a large per cent of the asthmatic

patients referred to us have had no previous medication other than antihistaminic drugs.

Another practice with which I do not agree is the general use of *antibiotics* in asthmatic patients with no evidence of infection. Patients with asthma may also have a respiratory infection for which an antibiotic may be indicated, but asthma is not an infectious disease and is not favorably influenced by antibiotics except when an intercurrent infection is present.

Piromen is a suspension of a sterile bacterial polysaccharide which, in enormous dilution, has been recommended for the relief of asthma. We have not found it of value.

For some obscure reason, *aspirin* occasionally

relieves asthma. Five grains are sometimes as effective as 0.5 cc. of epinephrine. Since some persons are dangerously sensitive to aspirin, it should not be prescribed until its safety has been established.

Alcohol has been effective in some patients but many are made worse by it.

Arsenic has been used in the celebrated "Gay formula" and seems to be of some help if continued over considerable time. It is, of course, a dangerous drug if used over long periods.

None of our medicinal agents cures asthma, but, if used to best advantage, the physician can relieve much suffering and earn the gratitude of distressed and frightened patients.

IN RECENT YEARS, the incidence of paralytic poliomyelitis in adults has increased. Because of this increase and because poliomyelitis tends to be more severe in older patients, immunization of adults is as essential as immunization of children.

Pure spinal poliomyelitis is the most common form of paralytic poliomyelitis in all age groups. Incidence of bulbospinal poliomyelitis increases with age, being about 7 per cent in children under 5 years of age and about 40 per cent in patients over 40 years old.

Extent of involvement with spinal paralysis also varies with age. In patients less than 5 years of age, monoplegia is most common; monoplegia and paraplegia are most frequent in patients 6 to 15 years old, while quadriplegia occurs in about one-half of patients over 15 years of age. In patients with monoplegia, the left side is more often affected than the right.

Bladder paralysis is more common in adults than in children, affecting one-third or more of patients 16 years of age or older. Respiratory muscle paralysis is 9 times as frequent in adults as in children. Mortality from paralytic poliomyelitis also increases with age. About 3.1 per cent of patients under 16 years of age, 8.5 per cent of those 16 to 30 years old, and 29.6 per cent of those 40 years of age or older die of the disease.

Sex also influences manifestations of poliomyelitis. More male than female children have paralytic disease, but adult women are affected more often than adult men. Disease tends to be more severe in female children and in adult males. Quadriplegia, respiratory paralysis, and death are more common among adult men than among women. Men over 40 years old appear to be most susceptible to severe paralytic poliomyelitis.

LOUIS WEINSTEIN, M.D., Boston University, New England J. Med. 257:47-52, 1957.

Health of the American Indians

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ON JULY 1, 1955, the Public Health Service, Department of Health, Education, and Welfare, took over administration of the medical program for Indians and Alaska natives. This responsibility was transferred from the Bureau of Indian Affairs, Department of the Interior, under the terms of Public Law 568, 83rd Congress, 2nd Session. To conduct this program, the Public Health Service organized the Division of Indian Health as part of its Bureau of Medical Services.

The provision of health services to the Indians has long been recognized as a federal obligation. Historically, this responsibility dates from the time the Indians were located on reservations by the federal government and were under the jurisdiction of the War Department. In 1849, the Department of the Interior was made responsible for Indian affairs, and later a program for medical care and health services was developed. In later years, the technical leadership for the health program within the Department of Interior was rendered by officers assigned from the Public Health Service. The existence and continuity of this knowledgeable leadership since the transfer of responsibility on July 1, 1955, have resulted in the maximum increase of services compatible with available funds.

The program of the Division of Indian Health is administered through 6 area offices in Portland, Oregon; Aberdeen, South Dakota; Oklahoma City, Oklahoma; Albuquerque, New Mexico; Phoenix, Arizona; and Anchorage, Alaska. Services are provided for approximately 315,000 Indians living on about 250 reservations in 24 states and approximately 35,000 natives in the Territory of Alaska. Excluded are sizable numbers of Indians living in the East whose care is not a responsibility of the federal government. Also excluded are those Indians who have voluntarily moved away from their reservations, mostly to the larger cities, and beyond the effective reach of Division of Indian Health facilities.

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The health status of the American Indian is, in general, that of any underprivileged group. The high disease indices always quoted pertain to those remaining on reservations and not to the thousands who have become a part of the dominant culture. There appears to be no predilection for certain diseases, but rather we observe the high rates in diseases identified with low economic resources. Those of us in the Indian health program feel that the socio-economic disadvantages prevalent among the Indians must be solved concomitantly with any marked improvement in their health status. In spite of the deficiency in such necessities as housing, clothing, food, transportation, and so forth, we find real concern among the Indians in regard to health matters and an increasing acceptance of recognized health procedures.

Recognition of the high incidence of preventable diseases is given in the 1956 annual report of the Department of Health, Education, and Welfare, which reads, "Historically, our Indians and Alaska natives have been isolated both geographically and culturally from the mainstream of progress that brought health records to each succeeding generation of Americans. The health needs of these people are critical. Their average age at time of death, for example, is 39 — compared with 60 for the general population.

"Most of their illnesses are tragically due to causes that can be prevented. For this reason, the Public Health Service has accelerated its program of disease prevention. More than \$4.3 million was spent in this effort during the year, and more than 500 of the 4,150 Indian health staff were engaged in preventive health activities."

The Public Health Service realizes that any health program of lasting value must be developed with the people concerned. Accordingly, at the reservation level, every effort is made to encourage self-reliance and independence on the part of the Indian people, and their participation is sought in planning health activities. The speed and success in this cooperative planning naturally vary as they would in any population group. The Indians are also assisted in making use of state and local services of health, vocational re-

habilitation, and crippled children's agencies.

At the national level, judgment of the Indians and other authorities is obtained through an Advisory Committee on Indian Health named by the Surgeon General in May 1956. This committee, with members representing medicine, science, law, education, journalism, and the Indian peoples, is aiding in the development of policies to improve health services to the Indians.

The goal is to develop a total health program, with equal importance given to the two major phases — preventive and curative. This will be obtained through direct operation by the Public Health Service when necessary or by contract services where such are possible and feasible. Full integration of both phases is also a goal as each supplements the effectiveness of the other.

In compliance with a request of the House Committee on Appropriations of the 84th Congress, 1st session, a comprehensive survey of Indian health needs was made. This report contains the following description of some communities among Northern Plains Indians that must be changed to gain the optimum in health progress.

ECONOMIC RESOURCES

"With the exception of one small reservation, both land resources and employment opportunities were considered to be wholly inadequate to support the population. On the largest reservation in the area, it was estimated that not more than a third of the present population could be supported from reservation resources even assuming more efficient use. Far less than this number were being supported at the time of the survey. On another reservation, approximately 5,000 Indians lived on land which could not support more than a tenth of that number. On a number of reservations, even the inadequate amounts of land available were not being used fully by Indians, and the trend seemed to be toward decreasing use. The sale of land had been increasing."

WATER SUPPLY

"The community provides itself with water from four wells and three sunken barrels placed in excavations in an intermittent stream bed. The only well that approaches sanitary approval is that at the school. An outside faucet on the pump house is maintained for the Indians to use as they wish. Fifty per cent of the households obtain their water here. Twenty per cent haul their water by automobiles, 20 per cent by wagon, and 60 per cent by hand. Milk cans, buckets, and barrels are used — none of which even approaches sanitary standards. Hauling distances

range from 50 to 700 yd., averaging about 400 yd. No disinfection of any kind is practiced."

EXCRETA DISPOSAL AND FLIES

"In the entire community (excluding the school), there is only one privy that meets sanitary standards. Every one of the others needs complete rehabilitation. Five families have no privies of their own. They share the facilities of neighbors. The most bothersome insects reported are flies, mosquitoes, and fleas — mostly fleas. Screens are absent from more than 60 per cent of the houses, and the unprotected outdoor cooking, eating, and sleeping in the summer provide these pests with abundant fresh food and human prey."

HOUSING

"Slightly over 75 per cent of the houses are of mud-caulked logs and earth covered roofs. About 20 per cent are of frame construction, 1 of these being of a log-frame combination. The remaining 5 per cent are classified as shacks, being thrown together with scraps of building material of any kind. The largest number of persons per dwelling is 11, the minimum 1, the average about 3. Although the average may seem low, the small size of the homes, in general, causes overcrowding. Slightly over 40 per cent have only 2 rooms, this being the maximum number of rooms in any habitation."

Such adverse environmental conditions over a period of several generations can well account for the facts that 33 per cent of the deaths among Indians occur before the fifth year of life, whereas only 8 per cent of the deaths in the general population are in this age group; that the Indian death rate from influenza and pneumonia is nearly 4 times that of the general population; that the death rate for tuberculosis is 5 times greater, and for enteric diseases 10 times greater than corresponding death rates in the population as a whole.

There are approximately 36,900 Public Health Service Indian beneficiaries in the 2 Dakotas and Nebraska. A review of certain communicable disease rates per 100,000 population reveals:

	1952	1953	1954	1955	1956
Tuberculosis, all forms	609.4	584.2	593.9	663.9	634.2
Influenza	203.1	3,313.8	2,661.1	81.3	46.1
Pneumonia	817.7	1,283.2	2,095.2	1,512.2	2,192.4
Diphtheria	13.0	2.6	2.8	10.8	5.4
Whooping cough	67.7	15.3	207.3	192.4	723.6
Poliomyelitis	26.0	25.5	2.8	8.1	5.4
Measles	658.9	377.6	596.6	514.9	1,124.7
Gonorrhea	466.1	607.1	753.5	929.5	916.0
Syphilis and sequelae	299.5	247.4	252.1	409.2	238.5
Typhoid fever	5.2	10.2	8.4	19.0	2.7
Dysentery, all forms	875.0	637.8	92.4	393.0	94.9

In this same population group and for the same years, the leading causes of death per 100,000 population were:

	1952	1953	1954	1955	1956
1. Heart diseases	181.8	145.4	137.3	86.7	149.1
2. Accidents, total	114.3	68.9	75.6	67.7	119.3
3. Tuberculosis, all forms	143.7	89.3	78.4	48.8	62.3
4. Symptoms, senility, ill-defined	129.0	68.9	42.0	75.9	84.0
5. Malignant neoplasms	90.9	48.5	72.8	43.4	56.9
6. Vascular lesions affecting central nervous system	55.7	30.6	36.4	46.1	35.2
7. Certain diseases peculiar to early infancy and immaturity unqualified	29.3	10.2	33.6	29.8	43.4
8. Gastritis, duodenitis, enteritis, and colitis	26.4	23.0	22.4	35.2	27.1
9. Birth injuries, postnatal asphyxia, atelectasis	29.3	30.6	14.0	32.5	13.6
10. Infections of newborn	20.5	17.9	22.4	21.7	16.3

The numerical standing of the preceding figures is based upon the five-year average.

In spite of the adverse socio-economic conditions under which most of the Northern Plains Indians live, the Public Health Service has found a great deal of initiative among the Indian groups in working toward a solution of their health problems. Of the total of 36,900 beneficiaries, 30,900 are served by directly operated

Public Health Service hospitals. The use of services by this latter group has remained about constant during the period fiscal year 1952 through 1956 but showed a pronounced increase in 1957.

	1952	1953	1954	1955	1956	1957
8 PHS operated Indian general hospitals	6,245	6,914	6,290	6,010	6,808	8,522
1 PHS operated tuberculosis hospital	189	204	298	287	462	410

In this same group, outpatient therapeutic visits in 1955 totaled 62,896; in 1956, 74,824; and in 1957, 79,897. Outpatient preventive visits in 1955 totaled 11,624; in 1956, 16,694; and in 1957, 31,942.

In conclusion, one can say that the Northern Plains Indians have too high an incidence of preventable diseases, that they live under adverse socio-economic conditions, but that they do use medical services and have an interest in participating in the development of a more effective health program.

For those interested in Indian health in more detail, reference is made to: *Health Service for American Indians*, Public Health Service Publication No. 531. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price \$1.75.

LACK OF MEDICAL KNOWLEDGE is less to blame for errors in diagnosis than lack of judgment, alertness, and thoroughness. The factors most commonly responsible for avoidable diagnostic errors are, in order of frequency: (1) failure to carry out or repeat necessary procedures; (2) neglect of symptoms or signs; (3) failure to account for abnormal laboratory, electrocardiographic, or roentgenographic reports; (4) attributing symptoms to the wrong condition, usually a previously diagnosed illness; and (5) failure to make admission screening tests.

In almost half of misdiagnoses, the history is not obtained from the patient himself, usually because of alcoholism, confusion, weakness, shock, coma, or aphasia. Alcoholism is implicated in 28 per cent of diagnostic errors; misleading normal roentgenograms in 12 per cent.

Infections, particularly bacterial pneumonia, meningitis, and bacterial endocarditis, are most frequently overlooked. Neoplasms, especially of the liver and brain, are almost as frequently missed. Abdominal disorders requiring surgery, especially those due to duodenal ulcer, and cardiovascular accidents are common sources of error.

A study of 1,106 autopsies showed that diagnoses were incorrect in 6 per cent.

ROBERT H. GRUVER, M.D., and EDWARD D. FREIS, M.D., Veterans Administration Hospital, Washington, D.C. *Ann. Int. Med.* 47:108-120, 1957.

Health Supervision of Children

A CAMPAIGN to encourage regular periodic health examinations of children has been instituted by the National Congress of Parents and Teachers. This has been recommended by Dr. Henry F. Helmholz, national chairman of the Committee on Health of the Parent-Teachers Association, and an advisory committee representing 20 organizations concerned with child health. In an editorial in the *Journal of the American Medical Association* on May 4, 1957, Dr. Helmholz outlines the recommendations which have been made. He tells how this is an outgrowth of the "summer roundup," which was begun by the National Congress of Parents and Teachers in 1925, to have all children receive a medical examination before entering the first grade in school.

The present recommendation is to extend this medical supervision to include regular yearly health appraisal of children through the grades and high school. This examination is to be performed by the physician and dentist who normally serve the child or family. Continuing health supervision is also recommended for infants and preschool children. The latter would, of course, be done more frequently than at yearly intervals. Immunizations should be carried out and booster shots given as needed. If symptoms or screening tests indicate anything suspicious of visual or hearing defects, appropriate consultation should be obtained. Any family or personal emotional problems should be discussed with the pediatrician or general practitioner who should appraise the case and arrange for psychology or psychiatric care if a case should require this type of evaluation or treatment. Diet and vitamins are to be discussed at these examinations, together with a brief discussion of normal physical and mental growth and behavior. In this day of television and many other distracting influences, it is always well to mention the desirability of limiting the time allowed for such activities, together with a recommendation as to the amount of rest needed at different age levels.

Officials of the P.T.A. throughout the country have been notified of the recommendations of the national organization and have been asked to support such health supervision. Physicians concerned with child care in each community are encouraged to take the initiative in instigating such a program in case it has not already been done by the P.T.A. Physicians and the local P.T.A. organization can work in cooperation with each other to good advantage. The importance of having this type of examination done by a private practitioner whenever possible should be emphasized to the P.T.A. members. A misunderstanding in our local community in past years led the P.T.A. to mistakenly inform parents that the "summer roundup" examination had to be done by the city health officer rather than the family pediatrician or general practitioner. That situation has since been corrected, but closer cooperation between interested parties could have prevented such a misunderstanding. The health officer and public health nurse are an integral part of the over-all program of child health, but their services should be reserved for cases in which financial or other reasons make private care impossible. I am sure that most health officers would agree that they cannot possibly examine all school children adequately and that this should be done by the family's own physician wherever possible.

In conclusion, the national Parent-Teachers Association stands ready to cooperate with local physicians and their state and county medical societies to promote better and more regular health care of children. As physicians, it is our responsibility to accept this challenge and offer our full support and cooperation, recognizing that this is simply putting emphasis on a practice which most physicians have been carrying out as a matter of course.

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Etiologic Factors in Renal Lithiasis, by ARTHUR J. BUTT, 1956. Springfield, Illinois: Charles C Thomas, 20 contributors, 18 chapters, 387 pages. \$12.50.

This book is a resume of the etiologic factors in renal lithiasis. The historic review and the discussion of the upper urinary tract obstruction and stasis are excellent. The remaining 16 chapters deal with anatomy and the metabolic, geographic, chemical, and infectious theories in the production of stone. There are sufficient illustrations of good quality. Several minor typographical errors are present. The bibliography is adequate. However, this text is of value primarily to those engaged in the investigation of renal lithiasis.

M. P. REISER, M.D.

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Atomic Energy in Medicine, by K. E. HALNAN, M.D. General editor, D. WRAGGE MORLEY, 1957. New York: Philosophical Library. 15 s.

This very readable book of 150 pages accomplishes to a remarkable degree what its author indicates in the foreword that he hopes it will do; namely, to provide an account of atomic energy in medicine intelligible for persons without intensive prior knowledge either of physics or of medicine. It provides an adequate account of the historic development and a simplified statement of the present status of knowledge of atomic physics, which can be very valuable to physicians whose formal education was completed before 1940 and, therefore, did not include much modern atomic theory. The book also presents a very interesting treatment of the rationale of the use of isotopic tracers in medical research and diagnostic problems. It uses illustrative instances to elucidate principles, rather than attempting an exhaustive factual treatment of the subject. An unusual feature of the book is a final chapter on The Future. In it, the author describes some newer research approaches that have not as yet led to any useful results, but which seem to him to hold promise. For example, "neutron-capture therapy," in which slow neutrons which themselves have little biologic effect are "captured" with subsequent release of alpha rays of high biologic activity by elements which can be highly concentrated in malignant cells by one or another method. Another new line of approach is through radiosensitizers of



which several types are known. The discovery of such substances which would be selectively concentrated in malignant cells would provide another possible approach to cancer therapy. The author also predicts great increases in the use of tracer methods in medical diagnosis. In these predictions, he stands on firm ground because these methods are already standard research laboratory procedures, and it is a virtual certainty that a quarter of a century hence they will be routine hospital laboratory methods.

M. B. VISSCHER, M.D.

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Clinical Pathology Data, by C. J. DICKINSON, B.S., B.M., M.R.C.P. ed. 2, 1957. Springfield, Illinois: Charles C Thomas, 91 pages. \$4.00.

This is not a textbook but a reference book listing the normal and pathologic alterations in all types of clinical laboratory procedures. The book is set up in tabular form and covers all aspects of clinical pathology, including physical properties of blood and plasma, tests of blood coagulation, red and white cell measurements, blood chemistry, cerebrospinal fluid, urine, feces, porphyrin metabolism, serologic tests for syphilis, and adrenal, liver, and renal function tests. The volume will be of value to the medical student and to many general practitioners whose association with some of the tests is sufficiently infrequent to necessitate a review of normal and pathologic values.

JOHN I. COE, M.D.

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Bedside Diagnosis, by CHARLES SEWARD, M.D., F.R.C.P., ed. 4, 1957. Baltimore: Williams and Wilkins Co., 420 pages. \$5.00.

This handy little volume is written for the physician who desires a ready source of recall. Division into 24 chapters is made in order to consider prominent symptoms and signs. There is a chapter on psychogenic symptoms and six chapters

on pain, including one on some general considerations. Chapters are included on hematemesis, hematuria, hemoptysis, and hemorrhagic diseases. The character of approach to each grouping might be illustrated by chapter 16 on dyspnoea, covering 22 pages and divided into physiology, the diagnostic approach, causes of respiratory tract and lung diseases, cardiovascular lung states, blood states, and causes of central nervous system diseases. The psychogenic causes are listed as hysteria and effort syndrome. Chapter 17 considers tachycardia, but the reviewer could find nothing on bradycardia. Normal values, found in chapter 24, are not covered as extensively as is the ease in most American hospitals. The author does not attempt to give attention to specific disease per se but only to the signs and symptoms pointing to them. The work is rather brief and tends toward minimal rather than to extensive discussion. For this reason, it should be of value to the "busy physician" whose time for study is limited.

S. MARK WHITE, M.D.

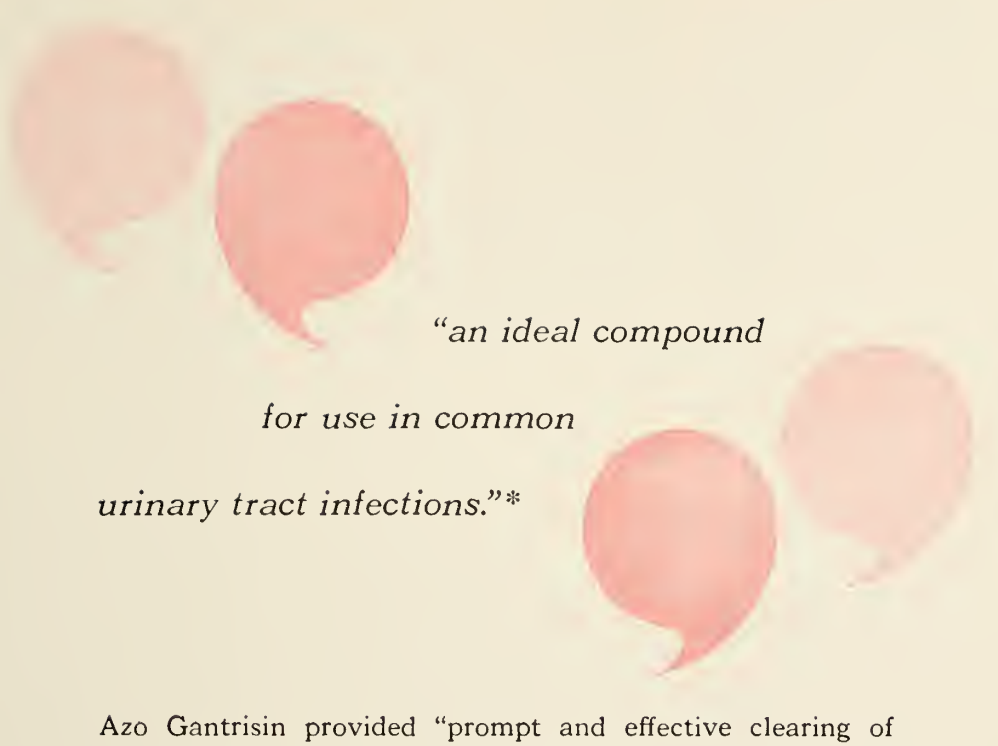
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The Salient Points and the Value of Venous Angiocardiography in the Diagnoses of the Cyanotic types of Congenital Malformations of the Heart, by BENJAMIN M. GASUL, M.D., GERSHON HAIT, M.D., and EGBERT H. FELL, M.D., 1957. Springfield, Illinois: Charles C Thomas, 80 pages. \$3.50.

This text presents the results of the studies of 421 venous angiocardiograms without the use of information from the history, physical, fluoroscopic, roentgenologic, electrocardiographic, cardiac catheterization, or autopsy findings. Diagnosis was based on angiocardiographic findings and the knowledge that the patients were cyanotic.

On the basis of the results of these studies, patients with cyanotic congenital heart disease were divided into 4 entities: group I, entities in which diagnosis can almost always be made by proper interpretation of technically good angiocardiograms; group II, entities in which diagnosis can usually be made; group III, entities in which diagnosis usually cannot be made; and group IV, entities which always require additional studies.

As the authors state, "this manuscript represents only a summary of the basic findings of the most im-

(Continued on page 26A)



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ORIGINAL RESEARCH IN MEDICINE AND CHEMISTRY

BOOK REVIEWS

(Continued from page 112)

portant types of congenital malformations of the heart." No other information, such as that obtained from electrocardiograms, is included.

Ten basic malformations are presented with excellent, concise summaries of gross pathology, hemodynamics, and salient angiocardio-graphic features. Diagrams and photographs are very clear and instructive. Thus, one purpose of this book, "to bring out the salient points in the angiocardio-graphic diagnosis of the various cyanotic types of congenital malformations of the heart," is well accomplished. The overlong title could well be shortened to "Handbook of Angiocardiology in Cyanotic Congenital Heart Disease."

The other purpose of this text, "to establish the value of angiocardio-graphy as a diagnostic tool for these entities," confirms the experience of various cardiac centers where the use of angiocardio-graphy in right to left shunts is nearly routine. However, the history, physical examination, roentgenograms, fluoroscopy, electrocardiograms, and physiologic studies often are equally important considerations. Thus, angiocardio-graphy will rarely be used as a

"separate laboratory tool" as it is in this study.

The percentages of correct diagnoses from the studies of angiocardio-graphs alone are excellent, especially in group I. It is feasible that biplane angiocardio-graphy at 6 to 12 frames per second will enhance the number of correct diagnoses in all groups.

Since some centers are performing selective angiocardio-graphy with mild sedation and without anesthesia, it is likely that correct diagnoses will be further increased with very little added risk to the patient. This should be especially true in groups III and IV.

This handy, concise study should be of very real value to the student of congenital heart disease.

JOHN P. VEIT, M.D.

Psychiatric Education and Progress, by JOHN C. WHITEHORN, M. D., 1957. Springfield, Illinois: Charles C Thomas, 45 pages. \$1.75.

This small book contains the 1955 Salmon Lectures of the New York Academy of Medicine. Doctor Whitehorn, in his well earned capacity as spokesman for the psychiatric profession, takes a critical, although

temperate, look at the present status of postgraduate education for the specialty of psychiatry. In approximately forty minutes reading time, a remarkably clear opinion can be obtained of the past and present state of things in this field. While acknowledging progress, he wisely points to the numerous problems ahead with particular reference to psychoanalysis and to psychiatric research and training for it. Because of the phenomenal impact the mental sciences have started to make on medical education in general, these lectures should be read by anyone interested in this topic.

DONALD W. HASTINGS, M.D.

The Chronically Ill, by JOSEPH FOX, 1957. New York: Philosophical Library, Inc., 229 pages. \$3.95.

Joseph Fox is the executive director of the Home for the Chronic Sick in Irvington, New Jersey. He has written a book of much interest to the physician, the social worker, the hospital administrator, and to people interested in labor and management. There is much valuable information on rehabilitation and the social problems of the chronically ill.

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FOREWORD

ANOTHER SERIES OF PAPERS of special interest to those interested in the control of tuberculosis and related conditions are appearing this spring in the JOURNAL-LANCET. The distinguished Wisconsinite, Dr. William S. Middleton, who now heads the Medical Division of the Veterans Administration, emphasizes the point recognized since ancient times that even today the personal relationship between patient and physician plays a very important role in the recovery of the patient in such diseases as tuberculosis where specific drugs are available. The appropriate title is "Not by Bread Alone."

The difficulties of tuberculosis eradication among human beings will be evident from the paper by the veterinarian, Dr. Paul S. Dodd of Illinois, on the tuberculin test as it applies both to use among cattle and in human beings. In some states, there is evidence of slight loss of ground in the bovine tuberculosis eradication program, which theoretically would seem so easy to bring to a successful conclusion.

There is increasing interest in the problem of radiation effects throughout this country and, indeed, throughout the entire world, as evidenced by recent correspondence I have had from all corners of the globe. The paper on this subject by Doctors Marvin, Loken, and Mosser, Department of Radiology, University of Minnesota School of Medicine will be of special interest. Although further data may cause some revamping of our current thinking, it would appear that the radiation dosage from the ordinary 14 x 17-in. film, or even from taking a photo-fluorograph, is so low that the possibility of genetic mutations of any significance is remote. This probably also applies with regard to possible adverse effects due to the direct radiation itself. These comments, of course, are with the assumption that the machines are properly equipped with cones and filters to eliminate any unnecessary stray radiation, have been checked by trained x-ray technicians, and are being operated by trained personnel who are aware of hazards of radiation. The current concern with regard to this problem does mean, however, that careful records must be kept to determine the fruitfulness of chest x-ray screening of various population groups which do not yield a significant number of new cases of tuberculosis and other chest pathology and with priority given to the more fruitful groups.

Finally, a tribute will appear to one of the pioneers in the voluntary tuberculosis field, Dr. Edward A. Meyerding, who is completing this spring thirty-four years as the chief executive of the Minnesota Tuberculosis and Health Association. The many readers who have known him will join with Dr. Myers in expressing appreciation to Dr. Meyerding for his many years of devoted service and in extending him all good wishes for the future.

JAMES E. PERKINS, M.D.,
Managing Director,
National Tuberculosis Association

Ionizing Radiation in Medicine

A Useful Tool and a Hazard

JAMES F. MARVIN, Ph.D., MERLE K. LOKEN, Ph.D., and
DONN G. MOSSER, M.D.

Minneapolis, Minnesota

THE ADVENT OF THE ATOMIC AGE with its manifold increase in resources relating to ionizing radiations has made it necessary to re-evaluate the uses of radiations from all sources—x-rays, radium, radioisotopes, and atomic energy. This has required a review of the usefulness versus existing or potential hazards of radiations in medicine, dentistry, industrial development of atomic power, and weapon testing programs. When these uses of ionizing radiations were first evaluated, statements appeared to the effect that no radiation hazard problem existed. The pendulum of thought has now swung in the other direction with its statements that fallout is periling all future generations, medical x-rays are producing genetic damage, chest x-rays for tuberculosis case finding are extremely dangerous, and that x-ray shoe-fitting machines are injuring our children.

We cannot accept without proper interpretation either the statement that no radiation hazards exist or the hysteria concomitant with theories that ionizing radiations have no place in our society. We are now in the atomic age and are utilizing the increased resources with a limited increase in radiation burden. It is not possible to outlaw the use of atomic energy and all other sources of ionizing radiations. We must recognize that man cannot have multiple radiation histories, so that any activity utilizing ionizing radiations which increases the radiation exposure to man will have repercussions on all other uses of such radiation. All sources of ionizing radiation thus relate to the present and future gener-

ations of man. Evaluation of the radiation hazard must also include the problem of the health and well-being of the individual, as well as genetic considerations relating mankind's future.

Any regulations, code, or legislation adopted for control of the radiation hazard cannot neglect any possible sources of ionizing radiations. Safe rules of conduct must include: (1) medical and dental x-rays, radium, and radioisotopes (now used much more generally than in the past) and radiations for industrial purposes insofar as these contribute to the irradiation of man, (2) devices such as shoe-fitting fluoroscopes, television, and electron microscopes, which may be sources of ionizing radiation, and (3) atomic energy for research, weapon testing, or power (including the mammoth radioactive waste disposal program).

BACKGROUND OR UNCONTROLLABLE RADIATION

All of us continuously receive radiation, termed background or unavoidable radiation, from cosmic rays descending upon us from outer space and from natural radioactivity in the earth, in our building materials, and in our bodies. Fallout from atomic weapon testing and contamination from the use of radioactive materials may increase the background or unavoidable radiation in a particular area to such an extent as to be considered dangerous.

Radiation exposure of an individual may originate from both external and internal sources. In most instances, exposure from external sources, principally x- and gamma rays, constitutes the greater hazard. Radioactive materials contained within the body constitute a greater hazard than when they are external sources because of the continuous irradiation of tissues surrounding them. Some of the radiations emitted by radioactive materials cannot penetrate sufficiently to be as serious a hazard as external sources but will be absorbed in vital tissues when the materials are internal sources. Also, some radioactive materials when taken internally are deposited

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Presented in part at district medical meetings in North Dakota and at Concordia College, Moorhead, Minnesota, sponsored by North Dakota Tuberculosis and Health Association.

permanently in the bone as radium²²⁶ or strontium⁹⁰.

The problems associated with the weapon testing programs of both the United States and Russia can be appreciated if one considers the reports which indicate seasonal and generally increasing levels of radioactivity in our rainfall and surface waters and reports which indicate generally rising levels of strontium⁹⁰ in bones as found at autopsy. The problems associated with increasing utilization of atomic energy for power purposes can also be appreciated if one considers the quantities of radioactive wastes produced per year, those expected to be produced per year in the future, and the recorded accidental release of radioactivity in event of failure of an atomic power system. The recently recorded uranium fire in the British power reactor at Windscale, in which radioactive products (Iodine¹³¹ was the major offender) were released over a populated area, is an example of the type of accident that has caused attention to be focused on the problems of safe operation of such reactors and civil liability in event of accident.

Industrial and research programs employing radiations do not deliberately employ man as the test object, but rather attempt to plan operations to avoid irradiations of man. On the other hand, medical use of ionizing radiations involves direct and planned use of ionizing radiations on man. Control of the radiation hazard is, therefore, a medical necessity, since this use of radiation has made and is making a vital contribution to man's health and longevity but retains equally well the possibility of detrimental effects on his health and longevity, as well as its potential effects on future generations.

BIOLOGIC EFFECTS

Effects of ionizing radiation may be manifested in many ways, depending on the biologic systems involved and the factors governing the exposure. Within months after Röntgen's momentous discovery of roentgen rays in 1895, pioneers in roentgenology, such as Dodd, developed severe dermatitis and submitted to first attempts at skin grafting for control of the skin lesions.¹ Daniel reported in 1896 a case of epilation following an attempt to demonstrate a metallic foreign body in the skull.² One of Edison's assistants, Clarence Dally, became the first known victim of x-rays, dying from "x-ray cancer."³ Radiations from radioactive materials were shown to produce many of the same effects. The death of Madam Curie, Nobel prize winner in nuclear chemistry, has been attributed to the effects of

radiation. Development of cancerous lesions on the fingers resulting from holding dental film in the patient's mouth during exposure has been too common an occurrence among dentists, particularly those who entered dental practice between the years 1919 and 1927.

The increased incidence of leukemia among radiologists is well documented.^{4,5} Other reports indicate a higher incidence of abnormalities in children of radiologists than in offspring of other physicians.⁶ Radiation exposure is considered the insidious common denominator in these and other such studies.^{7,8}

The biologic changes ascribed to radiation exposure are initiated by the absorption of radiant energy. This radiation may interact with atoms of a biologic system to produce ionization, leading to disruption of molecular bonds and formation of highly oxidative radicals. Since the maintenance and growth of biologic structures are dependent upon a multitude of chemical reactions, which must be maintained in delicate balance, the absorption of radiant energy leads to a change in this balance with ultimate modification or destruction of the system. The ultimate effect has been shown to depend on the dose of radiation delivered, the time involved in its delivery, and the type and energy of the radiation. The spatial distribution of the ionization is also a factor.

Since Muller's experiments with *Drosophila* thirty years ago, it has been known that ionizing radiations increase the gene mutation rate. The genes of mice have been shown to be 15 times more sensitive to radiation induced mutations than are those in *Drosophila*. Evidence of gene mutations in human beings obtained in Japan after the atomic blasts in Hiroshima and Nagasaki indicates that radiation-induced mutation rates in human beings appear to be close to those observed in mice. Mutations in the germ cells of the gonads are considered the most important factor in determining the effect of radiation because of the involvement of future generations. Furthermore, all mutations appear to be deleterious as has been observed in experiments with fruit flies, various experimental animals, and in cases of accidental exposure to man. On the basis of fruit fly data, the most frequent mutations are expected to cause minor impairments of body function rather than gross changes. These effects include increased susceptibility to disease, shorter life expectancy, and reduced fertility.

There is evidence that partial recovery from the effects of radiation is possible. However, in the case of genetic damage, most investigators agree that these effects are cumulative. Genetic

damage is an example of a nonthreshold response for which there is no recovery, and any dose is damaging. Threshold effects require some definite dose before observable changes occur and generally some recovery from damage is shown (figure 1).

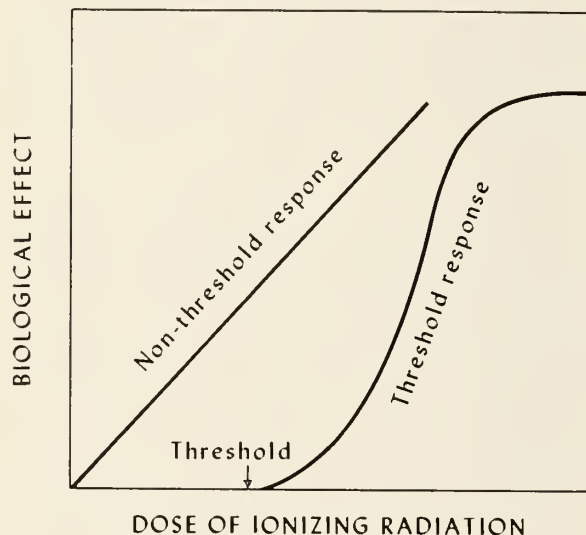


Fig. 1. Threshold versus nonthreshold phenomena.

UNITS FOR MEASUREMENT OF RADIATION

Radiation quantity can best be expressed in terms of absorbed dose in ergs per gram of tissue. Because of the difficulty in measuring energy absorption directly, several units have been introduced. The roentgen (r) is the unit of radiation exposure that was accepted in 1938, indicating the amount of x- or gamma radiation required to produce a definite quantity of ionization in air under a particular set of conditions. As ordinarily defined, 1 r of x-rays produces 87 ergs per gram of air or 93 ergs per gram of water equivalent tissue. With the advent of the medical use of radioactive isotopes, another unit, the roentgen-equivalent-physical (rep), was defined to include ionization resulting from alpha, beta, and other radiations. This unit matched the roentgen in terms of energy absorption in tissue but lacked some of the limitations imposed by definition on the roentgen. The rep has now been replaced by the rad, which is defined as the absorbed dose of radiation equal to 100 ergs per gram of tissue.

The energy absorption in terms of ergs per gram varies with the source and energy of the radiation as well as the nature of the tissue. At photon energies of 1 million volts (1 Mev)—the average x-ray energy from a 2 to 3 million volt x-ray machine or the energy from a cobalt teletherapy unit—the energy absorbed in ergs per

gram per roentgen of exposure is approximately 92 for muscle, 86 for fat, and 85 for bone. At photon energies of 50,000 volts (50 Kev)—the average x-ray energy from a 100 kilovolt x-ray machine—these figures become 90 for muscle, 58 for fat, and 400 for bone. Other values may result from the use of equivalent roentgens of other types of radiation, such as alpha, beta, neutron, and so forth. Energy absorption in the various tissues is thus expressed adequately in terms of rads, whereas the roentgen is not a suitable unit for this purpose.

Because the biologic effect on a particular animal, organ, or system may not depend directly on the energy expended in the tissue for the different types of radiation, another term, the rad-equivalent-man or mammal (rem), has been defined. The rem is the product of the dose in rads and a term known as relative biologic effectiveness (RBE). The RBE must be measured directly in terms of the effect of one type of radiation on a particular system compared to the effect of x-rays of known energy or, as is now preferred, to the effect of the gamma rays of either radium²²⁶ or cobalt⁶⁰. Thus, the RBE is a biologic unit, which may have different values for the various organs of the same animal. Likewise, the rem is a biologic unit. Fortunately, the RBE is 1.0 or very close to 1.0 for the x-rays and gamma rays which are of the greatest importance in clinical medicine.

PERMISSIBLE LIMITS OF RADIATION DOSE TO MAN

It is difficult to assay the harmful effects of small doses of radiation. A base line can be established using measured values of background radiation. The average exposure is considered to be of the order of 3 millirems per week or 5 rems per generation (from conception to age 30). This background radiation increases with altitude and may be higher in some locations, such as parts of Sweden, where radioactive elements in building materials result in values as high as 8 millirems per week.⁹

Genetic evidence indicates there is no safe dose of radiation.¹⁰ Thus, it becomes necessary to balance the genetic risk against the benefits derived from the various uses of radiation. A National Academy of Science report estimates that 30 to 80 r constitutes a "doubling dose," that is, this dose will double the spontaneous mutation rate.¹¹ On this basis, this report includes a recommendation that the maximum permissible dose (MPD) be set at 10 r to the gonads during the prereproductive lifetime of the population. If 50 r is then accepted as the av-

crage doubling dose, a population receiving an average of 10 r will show a 20 per cent increase in gene mutation rate. This represents an expected increase in abnormalities in offspring attributable to genetic mutation from the normal incidence of 2 to 2.4 per cent.¹² Although these estimates are based on data derived from experiments with fruit flies and mice, evidence indicates that the data may also be valid for human beings.

The National Committee on Radiation Protection (NCRP) has recommended that the MPD of 0.3 rems per week, which was accepted prior to February 1957, be reduced.¹³ This committee recommended that the MPD be set at no more than 0.3 rems in any one week, with a limit set at 3.0 rems in any thirteen-week period and a further limit set at 5 rems per year. For the population at large, a lower limit was recommended of 0.5 rems per year, which is a factor of 10 below the "occupational exposure" levels. This latter recommendation has been published in terms of a gonadal dose to the whole population now to exceed 14,000,000 rems per 1,000,000 people from conception to puberty, which would average approximately 0.5 rems per year.

CONTROL OF RADIATION

Radioactive fallout. Background radiation for all individuals in a given area may increase as a result of weapon testing, atomic power plant failure, or faulty waste disposal programs. This will lead to increased quantities of external radiation and to an increased probability of ingestion of radioactive materials. This situation has now been shown to exist in a large part of the United States and, particularly, the upper Midwest as a result of radioactive fallout from nuclear weapon testing.

The Minnesota Department of Health has just released data on tests of Minnesota's surface waters, which indicated that during the entire summer and early fall of 1957, levels of radioactivity in Minnesota's rainfall and in the surface waters exceeded the maximum permissible concentration (MPC) of mixed fission products as established in the National Bureau of Standards (NBS) *Handbook 52* (values of MPC as given must be altered in accordance with present MPD).¹⁴ The data released do not constitute evidence that a real hazard exists but only that utilization of atomic energy in weapon testing does result in a real and measurable increase in background radiation. Knowledge of the increase in radioactivity to the levels shown constitutes a mandate that studies be initiated and maintained to evaluate the hazard in terms of

concentrations of particular radioisotopes. The studies must indicate whether or not removal of these isotopes from drinking water is necessary and must warn of any future increases in levels of radioactivity.

Radioisotopes. Radium and thorium and their products have been the radioactive materials most commonly used in medicine. In the past, radium has very often been stored in the office safe in the hospital or office. This practice is a violation of all rules of radiation safety.

Radioactive isotopes are now being used in medicine for such purposes as diagnosis and treatment of thyroid disease (I¹³¹), measurement of blood (plasma) volume (I¹³¹ labeled human serum albumin), measurement of red cell volume and survival (Cr⁵¹), pernicious anemia (Co⁶⁰ labeled vitamin B₁₂), tumor detection and treatment of blood dyscrasias (P³²), cardiovascular studies (I¹³¹, Na²⁴), and metabolism of elements (P³², Na²⁴, Ca⁴⁵), or of labeled organic materials (S³⁵, C¹⁴).

The relative hazard of the radioisotopes depends on the lifetime and site of deposition in the body and on the energy and type of radiation (table 1). Certain isotopes, such as Sr⁹⁰, I¹³¹, and Fe⁵⁹, are considered particularly dangerous because they are readily metabolized, concentrated in critical organs, and remain for long lifetimes. Quantities of particular isotopes (microcuries) permitted in the body, if present MPD is not to be exceeded, are given in table 2.

Röntgen rays for diagnostic purposes. The hazards associated with the use of x-rays for diagnostic purposes may be considered in 3 major categories: (1) equipment, (2) protective devices, and (3) safety habits. Tables 3, 4, and 5 summarize recommendations for the control of hazards in fluoroscopy and radiography. This information was derived primarily from the specifications of the NCRP listed in NBS *Handbook 60* on "X-ray Protection."

Fluoroscopy presents the greatest potential radiation hazard among the various diagnostic procedures in which x-rays are used because of the time that may be involved. If the precau-

TABLE 1
FACTORS DETERMINING HAZARD FROM RADIOISOTOPES

1. Quantity of material used.
2. Body retention.
3. Radiosensitivity of the involved tissues.
4. Relationship of involved tissues and organs to body function.
5. Effective half life of the isotope.
6. Energy and character of the emanations.

TABLE 2
MAXIMUM PERMISSIBLE CONCENTRATIONS OF SOME RADIOISOTOPES IN THE BODY

<i>Element</i>	<i>Emission</i>	<i>Site of localization</i>	<i>Effective half life (days)</i>	<i>MPC* (microcuries)</i>
Ra ²²⁶ + ½ dtr. product	alpha	bone	1.6 x 10 ⁴	0.03
U (natural)	alpha	bone, lung, kidneys	30-120	0.003
Au ¹⁹⁸	beta, gamma	kidneys	2.69	3.3
I ¹³¹	beta, gamma	thyroid	7	0.1
Sr ⁹⁰	beta	bone	2.7 x 10 ³	0.3
Co ⁶⁰	beta, gamma	liver	9	1.0
Fe ⁵⁹	beta, gamma	blood	27	330
Cu ⁴⁵	beta	bone	151	22
S ³⁵	beta	skin	18	33
P ³²	beta	bone	14	3.3
Na ²⁴	beta	total body	0.61	5
C ¹⁴	beta	total body	130	250

*MPC is based on MPD of 0.1 rems per week.

TABLE 3
FACTORS FOR CONTROL OF RADIATION EXPOSURE
IN FLUOROSCOPY

<i>Fluoroscope</i>
1. Maximum of 0.1 r/hr./meter leakage radiation.
2. Cone and adjustable diaphragm to limit the beam.
3. 2½ mm. aluminum filter permanently fixed.
4. Target-to-table distance at least 18 in.
5. "High-low" milliamperage change over switch.
6. Cumulative timing device.
7. 1.5 mm. lead equivalent material in fluorescent screen.
8. 10 r/min. maximum dose at the table top.
9. ¼ mm. lead equivalent drape during horizontal use.
<i>Protective devices</i>
1. 1.5 mm. lead equivalent in doors and walls to 7 ft.
2. Leaded aprons and gloves worn by fluoroscopist.
3. Radiation monitoring with film badges or pocket dosimeters.
4. Leaded drapes overlying patient's gonads when possible.
<i>Safety habits</i>
1. Trained personnel.
2. Maximum utilization of inverse square law.
3. Small field size and limited time of operation.
4. Adequate dark adaptation.
5. No holding of patients.
6. Fluoroscopist's hands (with gloves) not placed in direct beam.

TABLE 4
FACTORS FOR CONTROL OF RADIATION EXPOSURE
IN RADIOLOGY

<i>Radiographic machine</i>
1. Maximum of 0.1 r/hr./meter leakage radiation.
2. Cones or diaphragms to limit field size.
3. 2½ mm. aluminum filter in medical units.
4. 1½ mm. aluminum filter in dental units.
5. Exposure meter to limit time.
6. Remote control switch operated from protected area.
<i>Protection devices</i>
1. 1.5-3 mm. lead equivalent in doors and walls to 7 ft.
2. Radiation monitoring recommended.
3. Leaded drapes overlying patient's gonads when possible.
<i>Safety habits</i>
1. Trained personnel.
2. Maximum utilization of inverse square law.
3. No holding of patients.
4. Use of lead drapes if patient attendance is necessary.
5. Limit number of exposures by careful technique.

TABLE 5
FACTORS FOR CONTROL OF RADIATION EXPOSURE
FROM PORTABLE UNITS

1. Radiation monitoring is recommended.
2. Trained personnel.
3. No holding of patients or film cassette.
4. Use of leaded aprons and drapes for patient and operators.
5. Rotation of operators among various x-ray diagnostic units.

tions listed in the tables are observed, the radiation to which the fluoroscopist and assistants are exposed can be controlled well below present MPD levels even for heavy schedules of work. The use of old machines that do not adhere to the specifications as listed by the NCRP may be a real source of difficulty. Adequate shielding in the tube housing and cone, shutters that operate properly, and sufficient filtration are all very important in eliminating unnecessary radiation exposure. The importance of using lead aprons, gloves, and proper protective barriers cannot be overemphasized. A means for periodic radiation monitoring is also recommended. This can be done simply and effectively without great expense by using dental film, special monitoring film, or pocket dosimeters.

Actually, good safety habits are the most important factors in controlling radiation exposure. Protection by distance (inverse square law), limitation of the field size, control of time, adequate dark adaptation, and avoidance of the primary beam are all practices readily available to the careful fluoroscopist. Scattered radiation through the Bucky slot and from the patient and table top leads to significantly higher dose rates at the position occupied by the fluoroscopist during horizontal fluoroscopy than during vertical fluoroscopy. Therefore, an additional leaded drape is recommended for use in horizontal fluoroscopy (table 3). Effect of field size and filtration on radiation levels at various points of interest during fluoroscopy are shown in figure 2.

Even as fluoroscopes present the major hazard to the operator, so these units also constitute the greatest potential danger to the patient. A dose rate of 10 r per minute is permitted at the table top of a fluoroscope (table 3), so that long periods of exposure result in a sizable patient dose. In a radiation hazard survey of fluoroscopes with no filtration and with a short focal spot to table top distance, we have measured dose rates in excess of 35 r per minute at table top. Under these conditions, the patient may very well receive a dose sufficient to produce a sharp erythema. Bell has referred to the patient hazard during fluoroscopy in an article appropriately entitled "X-ray Therapy in Fluoroscopy."¹⁵ He reported that under extreme conditions, as during gastrointestinal fluoroscopy at 80 kvp, 3 ma, with no added filter, that a patient may receive a skin dose of 400 r and a dose of 47.5 r at a depth of 10 cm. in the tissues. A summary of measurements of patient exposure under varying conditions of fluoroscopy is shown in table 6. These measurements serve to emphasize the importance of filtration,

control of time, and the limiting of field size to keep the integral dose as low as possible.

In conventional, carefully executed radiography, the operator is in little danger of radiation exposure. Special techniques, such as urography, angiocardiology, cerebral angiography, and aortography, which require the presence of a physician and assistants in the radiographic room, produce a potential radiation problem that can be controlled by use of leaded drapes properly placed, in addition to maintaining the greatest possible distance from the x-ray beam. A number of reports illustrate the pronounced decrease in exposure to x-ray personnel that may be effected by simple safety considerations. For example, Ritvo and associates¹⁶ reported that with the use of proper coning, filtration, and position, it is possible to reduce the dose to the physician's hands in urethrography from 66 mr to less than 13 mr per exposure. Our own measurements indicate exposure to the physician's hands during cerebral angiography can be reduced to 2 mr per exposure. If the hands approach the beam or if a larger beam is used, the exposure increases 15 to 30 times. In femoral arteriography and lumbar aortography, a lead apron used as a drape can reduce the exposure from 300 mr to less than 20 mr.

Photofluorography deserves special mention because of its use in extensive surveys for tuberculosis and certain hospital admission procedures. Many of the older units were notoriously hazardous for the operators. The majority of the newer units have incorporated protective barriers and remotely located switches for controlling exposure. Studies of this hazard have been published by several authors.^{17,18}

Because of the confined areas in which these units are operated, great care must be exercised in placing the x-ray personnel in positions of utmost safety. Small changes in location can result in large differences in exposure. For this reason, it has been recommended that a protection survey be made for all of these units.¹⁷ Furthermore, it is recommended that personnel be rotated among the various tasks assigned in this survey program in order to keep the exposures to any one group below the MPD.

Patient exposure from radiographic installations may reach hazardous levels if the filtration of the machine is inadequate, if the primary beam is not restricted by coning, and if the number of radiographs is not carefully controlled. Average exposures for conventional radiographic techniques using x-rays filtered by 2 mm. of aluminum and with field size limited by cones or diaphragms are summarized in table 7. These

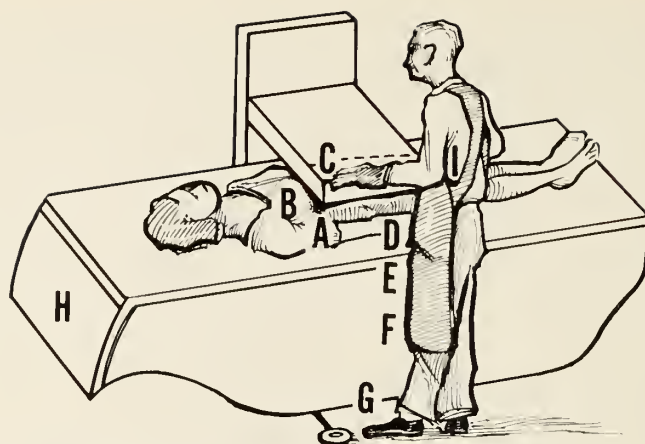


Fig. 2. Effects of field size and filtration on radiation exposure in fluoroscopy

Filtration Field size	Fluoroscope 90 KV, 3 MA			
	1 mm. Al.		3 mm. Al.	
	7 x 9	4 x 4 (in.)	7 x 9	4 x 4 (in.)
A	12 r/min.	12 r/min.	7.2 r/min.	7.2 r/min.
B	.38 r/min.		.36 r/min.	
C	4.2 mr./hr.	4.2 mr./hr.	4.0 mr./hr.	4.0 mr./hr.
D	550 mr./hr.	180 mr./hr.	400 mr./hr.	90 mr./hr.
E	240 mr./hr.	50 mr./hr.	200 mr./hr.	45 mr./hr.
F	450 mr./hr.	110 mr./hr.	200 mr./hr.	
G	20 mr./hr.	15 mr./hr.	15 mr./hr.	12 mr./hr.
H	40 mr./hr.	19 mr./hr.	30 mr./hr.	17 mr./hr.
I	6 mr./hr.	6 mr./hr.	6 mr./hr.	6 mr./hr.

doses represent an average of our measurements together with those reported by others.¹⁹⁻²²

It may be seen that the skin dose to a patient's chest is considerably higher in photofluorography than in conventional 14 x 17 in. radiographs of the chest. The average dose was found to be about 750 mr, whereas, with the 14 x 17 in. plate, the average dose was found to be 30 mr. This represents about a 25-fold difference in exposure. A corresponding difference in the gonadal dose would be anticipated and has been

confirmed in the measurements reported by Webster and Merrill.¹⁹

For exposures in which the gonadal dose varies appreciably with sex, both values are given. It is noteworthy that the use of a leaded apron to protect the gonads for x-ray procedures not involving this region permits reduction of the gonadal dose by a factor of about 4.²³

Another diagnostic procedure involving unusual hazards to the operator is dental radiography, in which exposures to the dentist may be

TABLE 6
PATIENT EXPOSURE IN FLUOROSCOPY

	Machine		
	No. 1	No. 2	No. 3
Exposure (table top)	36 r/min.	6 r/min.	1.5 r/min.
Skin dose (5 min.)	180 r	30 r	7.5 r
Integral dose (5 min.)	52,000 gm.-r	17,300 gm.-r	4,320 gm.-r
10 x 10 cm. field	(560 ergs)	(186 ergs)	(47 ergs)
20 x 20 cm. field	208,000 gm.-r	69,000 gm.-r	17,250 gm.-r
	(2,240 ergs)	(743 ergs)	(185 ergs)

TABLE 7

PATIENT EXPOSURE IN RADIOGRAPHY

AVERAGE EXPOSURE (MILLIROENTGENS) FOR CONVENTIONAL TECHNIQS USING X-RAYS FILTERED BY 2 MM. AL.
AND WITH FIELD SIZE LIMITED BY CONES AND DIAPHRAGMS

<i>Anatomy</i>	<i>View</i>	<i>Skin dose (mr.)</i>	<i>Gonadal dose (mr.)</i>
Skull	AP	600	.02
Shoulder	AP	200	.02
Hand		120	.03
Chest	PA	30	.03
Chest (P.R.)°	PA	750	.75
Abdomen	AP	550	20 (150)**
G.I. series	PA	900	5 (50)
	Lateral	2,000	10 (60)
Barium enema	PA	1,000	30 (200)
	Lateral	2,500	40 (270)
Spine (lumbar)	AP	800	15 (150)
	Lateral	2,300	40 (240)
Pelvis	AP	600	450 (150)
	Lateral	2,000	1,500 (400)
Knee	AP	40	0.3
Foot	AP	20	0.2

°Photofluorogram

**Indicates gonadal dose to females when significantly different from males.

TABLE 8

PATIENT EXPOSURE FROM DENTAL X-RAY UNITS

Doses to the skin: 65 kvp, 10 ma, 3 seconds

<i>Machine</i>	<i>No filter</i>	<i>With added filter</i>	<i>With added filter and fast film</i>
No. 1	1.0 r	(½ mm. Al.) 0.66 r	0.22 r
No. 2	2.8 r	(2½ mm. Al.) 0.7 r	0.24 r
No. 3	2.4 r	(1 mm. Al.) 1.4 r	0.5 r
No. 4	2.4 r	(1 mm. Al.) 1.3 r	0.33 r
No. 5	4.0 r	(2½ mm. Al.) 2.2 r	0.7 r

All machines properly coned. Approximately ffd 14 in.

Maximum estimated dose to skin for 14 exposures (full mouth series)

<i>Machine</i>	<i>No filter</i>	<i>With added filter</i>	<i>With added filter and fast film</i>
No. 1	9 r	6 r	2 r
No. 2	26 r	6.5 r	2.2 r
No. 3	22 r	13 r	4.7 r
No. 4	22 r	12 r	3.1 r
No. 5	37 r	20 r	6.5 r

Gonadal dose estimated per full mouth series

4-5 mr.

2 mr.

less than 1 mr.

Information obtained through courtesy of Dr. E. E. Peterson, University of Minnesota School of Dentistry.

as high as 1.5 r per hour of operation.²⁴ The practice of holding the film in the patient's mouth must be prohibited for reasons already mentioned. The operator of a dental x-ray machine may receive a total body dose of 125 mr per full mouth set of x-rays if care is not exercised.

Exposures to patients from 5 dental units at

the University of Minnesota Dental Clinic are summarized in table 8. These units were operated as installed and then with addition of proper (maximum useable) filter and with the usual medium speed and then with the fastest film available. Proper coning of the beam was utilized in all procedures. This table illustrates the reduction which is readily possible in radia-

tion dose to the patient in dental radiography.

Ionizing radiations used in such devices as shoe-fitting fluoroscopes are also directed deliberately at man. These units are x-ray machines, usually operated at 50 kvp, 3-8 ma, 7.5-20 cm. focal-skin distance and with or without the proper 1 mm. aluminum filter. These units may or may not be adequately surrounded with lead barriers for operator protection. The Minnesota State Department of Health surveyed 138 of these machines and found that the radiation dose to the foot ranged from 0.4 to 23 r per exposure with an average of 1.96 r. Radiation to the operator ranged from 0 to 250 mr per hour with an average of 10.5 mr per hour. In the past, control of these machines has been understood to mean adequate protection for the operator, limited time of exposure (5 seconds), dose to the foot per exposure not to exceed 1 r and an annual limitation of 15 exposures per foot (a very difficult number to control).²⁵ At the present time, the use of these machines is prohibited in the Commonwealth of Pennsylvania, in New York City, and in Minneapolis (by ordinance). The American Medical Association at its meeting in Philadelphia in December 1957 took a very strong stand to eliminate further use of fluoroscopes for the fitting of shoes. At the present time, any recommendation favoring control of these units rather than their elimination would not appear to be in order.

Radiation therapy also carries a somatic and genetic risk for the patient. When treating malignant disease, there can be no question that the risk is justified. However, the use of x-rays and radium in treating benign conditions, particularly those of the skin, such as acne, neurodermatitis, hemangioma, and verucca of the hands and feet, must be carefully limited to conditions which cannot be effectively controlled by other methods.

Radioactive isotopes for most clinical purposes carry practically no radiation risk, except in the presence of pregnancy. We feel that it is desirable to withhold even small tracer doses of radioisotopes in pregnancy because of potential hazard to the fetus. There is some debate concerning the relative radiation hazard when using radioactive iodine to treat hyperthyroidism in patients under 35 years of age. The hazard of inducing thyroid malignancy is as yet theoretic and must be balanced in the physician's evaluation against the known small but, nevertheless, real hazards of other therapeutic methods. It is unlikely that other properly conceived human uses of radioisotopes will represent any real hazard to patients.

RADIATION DIARY

How might one determine his exposure to radiation over a period of months and years? For individuals whose occupations require the use of ionizing radiations, this problem is most efficiently handled by the use of film monitoring badges or pocket dosimeters carried at various parts of the body. The exposures received can be logged for a continuous record. Many hospitals are doing this routinely to safeguard the health of their workers, as well as to provide legal protection for the hospitals.

For the population in general, this task is much more difficult, if not impossible, to carry out satisfactorily. The NRCP has given thought to this problem in order to assist the state health departments in setting up specifications for the control of radiation hazards.²⁶ A radiation diary to be carried by everyone from the cradle to the grave has been considered. However, the problems in administering such a program are overwhelming to say nothing of the added instrumentation and training required to make logical estimates of gonadal doses for all exposures. For example, there are some 100,000 diagnostic x-ray units in operation in the United States with only about 5,000 certified radiologists. Even among this group of specialists, there would be considerable difficulty in estimating gonadal doses or even skin doses for all exposures.

SUMMARY

Ionizing radiations have in the past served a very important role in the medical advances responsible for the improved health and longevity of our population. They have served equally well in industry by contributing to our improved living standards. All of us should be aware that ionizing radiations may equally well constitute health hazards. Unwisely used, some increased longevity and well-being may be sacrificed.

The medical profession has a moral responsibility to keep the radiation dose at a minimum compatible with good medical diagnosis and therapy. Radiation dose should be known and controlled for the patient, physician, assistants, and general public. The use of ionizing radiations for diagnostic purposes should not be a substitution for careful physical examinations and complete patient histories. The benefits of ionizing radiations for therapeutic purposes should be carefully weighed against the risks. During the childbearing period, the utilization of x-rays or administration of radioisotopes should be more carefully controlled than in older patients. It may be desirable to completely eliminate the use of radioisotopes and to sharply

curtail the use of x-rays during pregnancy. Radiographic rather than fluoroscopic examination may be the diagnostic choice in studies of infants and in most studies of the heart and lungs, since one minute of fluoroscopic examination results in a radiation dosage comparable to that received from several hundred radiographs.

The medical profession must constantly strive to improve its x-ray equipment so that required studies can be performed with a minimum of radiation. This implies at the present time the use of adequate radiation barriers around the x-ray tubes; adequate cones or diaphragms to limit the size of the radiation fields; high speed intensifying and fluoroscopic screens and film; adequate filtration on all units, including portable x-ray machines; adequately protected control areas for the diagnostic and therapy machines; and use of suitable lead drapes, aprons, gloves, and other protective devices.

Training in the use of ionizing radiations cannot be overemphasized. Poor safety habits on

the part of the technician or the physician may destroy all the benefits of the protective barriers and devices in an x-ray department. The presence of a technician or physician may be required and desirable during an x-ray exposure, but lack of protective aprons and gloves can only be considered a very poor safety practice.

Cognizance of radiation hazards coupled with good judgment and common sense²⁷ will go a long way in reducing the exposure of our whole population to ionizing radiations for diagnostic purposes. It is not unreasonable to expect that with improvement in technic, radiation to the general population from medical x-rays presently estimated at approximately 5 r per thirty years (equal to the natural background) may be substantially reduced despite an increased use of ionizing radiations in medicine. On this basis, we believe that no significant genetic problems need be anticipated in future generations as a result of the use of ionizing radiations in medicine.

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Injury from Blunt Trauma to the Chest:

Its Management in the Community Hospital

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A FALL CAUSED BY tripping or slipping continues to supply each doctor's practice with a constant number of patients with chest injuries. The great majority of such injuries are of a relatively minor nature, such as abrasion or contusion to the chest wall or simple rib or costal cartilage fracture. The over-all incidence of chest injuries, however, is increasing directly as the modern automobile becomes faster, the modern highway becomes smoother and straighter, and activities of life become more mechanized. Thoracic injuries resulting from automobile accidents, as from other sources of major trauma, commonly represent only a part of the total body injury, which may include a variety of fractures to the extremities, injury to the abdominal viscera, and serious head injury. By the nature of the organs affected, however, thoracic trauma is often of major importance in the total body injury and demands prompt, effective treatment if life is to be salvaged. The fact that the majority of these serious chest injuries occur at places remote from the large medical centers with their specialized equipment and personnel prompts the writing of this article. It is felt that early application of certain simple technics, using equipment available in even the smallest hospital, will result in salvaging the lives of a number of patients with chest injuries who might otherwise be lost at the local hospital or in transit to the medical center.

Case 1. A 49-year-old white man suffered a severe bilateral crushing injury of the chest when he was caught under his tractor after it overturned. He was admitted to a community hospital in western Minnesota where he was treated with tracheotomy, bilateral intercostal catheter drainage of the pleural space, and blood transfusions. Severe subcutaneous emphysema is to be noted in figure 1a. It should be recognized as one sign of an undrained pneumothorax. In itself this not harmful. It is, rather, evidence of beneficial decompression of a pneumothorax into the soft tissues. In figure 1b, the final radiologic result is evident. The patient continues to work full time as a farmer.

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MINOR CHEST INJURIES

Abrasion, contusion, and laceration. Of the lesser injuries, lacerations (after suture), abrasions, and burns of the chest, as elsewhere on the body, are best treated by the "open method" without dressings, antiseptics, or ointments but with a twice daily soap and water washing.

Simple fracture of rib or costal cartilage. For the patient who complains of chest pain aggravated by straining, bodily movement, deep breathing, or coughing and who gives a history of recent injury, a properly conducted physical examination is the most reliable means of diagnosing a fracture of a rib or costal cartilage. Each rib should be examined by exerting pressure on it away from the area of injury and pain. The motion caused at the fracture site by this maneuver aggravates the patient's pain and avoids the confusing factor of soft tissue tenderness when pressure is applied at the site of trauma. The lower six ribs are counted and examined, starting with the twelfth and proceeding cephalad posteriorly. Because of the presence of the scapula and heavy shoulder muscles posteriorly, the upper ribs are best counted off and examined anteriorly or in the axilla. Whereas, physical examination is most reliable in the diagnosis of a chest-wall injury, the roentgenogram is essential in the discovery of an intrathoracic injury. We, therefore, omit roentgenograms for rib detail and order instead routine upright posteroanterior and lateral x-ray films of the chest for signs of intrathoracic disorder. In patients with simple rib fracture, the routine chest x-ray film may be normal and, in such cases, the physician's function is to provide relief of pain and discomfort. In most instances, the nonclastic canvas rib belt snugly applied provides sufficient immobilization of the fracture and consequent relief of pain, so that respiration is freer, cough is effective, rest is possible, and the patient is able to resume even rather heavy labor in a relatively short time. In patients with pulmonary emphysema or marginal respiratory reserve of any cause, the splinting of

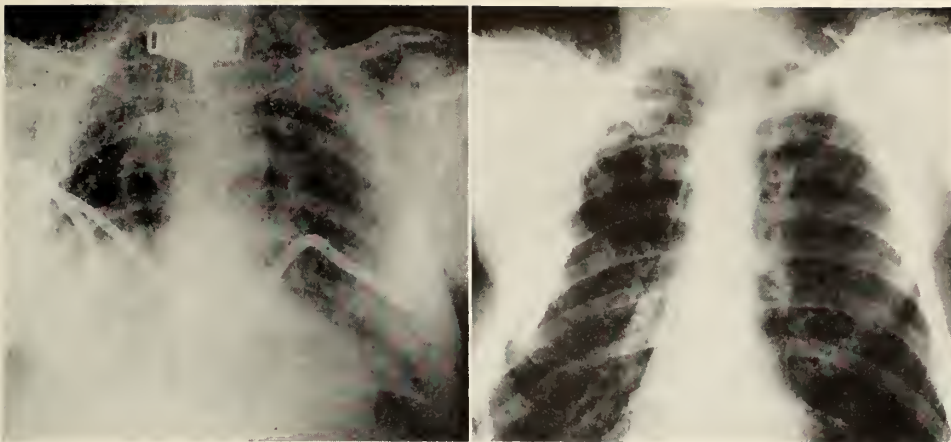


Fig. 1a (left). Note severe subcutaneous emphysema. b (right). Final radiologic result.

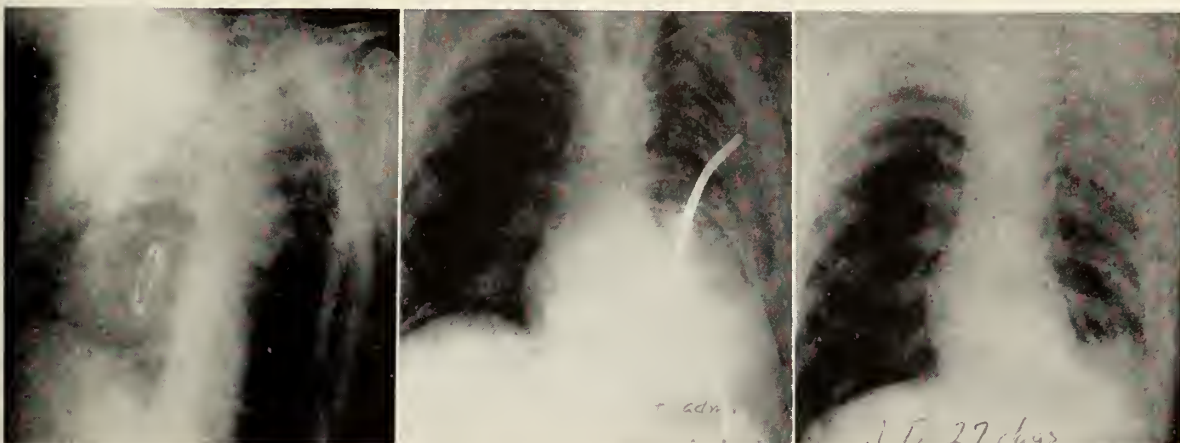


Fig. 2a (left). Admission roentgenogram showing multiple rib fractures, fracture of the left clavicle, and left pneumothorax with severe shift of mediastinal structures to the right. b (center). Improved appearance of chest two days after injury. c (right). Chest roentgenogram twenty-seven days after injury.



Fig. 3a (left). Immediate preoperative film. b (right). Immediate postde-cortication film.

respiration with simple rib fracture may be a serious handicap and lead to the accumulation of pulmonary secretions and consequent atelectasis and pneumonitis. In these patients, application of certain measures, which will be discussed under the heading of major thoracic trauma, may be necessary.

MAJOR THORACIC TRAUMA

Injury to the chest of a more serious nature is best considered from the viewpoints of: (a) the effect on the organs and structures under the protection of the rib cage and (b) the effect on the mechanics of respiration. In considering the organs and structures which may suffer damage in any thoracic injury, we at once recall the heart, lungs, great vessels, esophagus, trachea, bronchi, thoracic duct, and diaphragm. There are, of course, several additional important structures which depend upon the protection of the rib cage albeit they lie below the diaphragm. These are primarily the spleen, liver, pancreas, and kidneys. Some of the hollow viscera, such as the stomach, duodenum, and portions of the colon, are at least partially intrathoracic.

The organ most often presenting clinical evidence of damage in major chest trauma is the lung. Simple contusion of the lung with a localized area of parenchymal hemorrhage casts a shadow upon the x-ray film but usually requires no specific treatment. More often there is a laceration of the parenchyma with air leak and bleeding, which cause a hydropneumothorax on the upright chest film. While the air leak may not be rapid, it always has the potential of causing serious disturbance, such as a tension pneumothorax. The bleeding most frequently is from the low pressure pulmonary system and tends to cease spontaneously before any great amount is lost. Treatment consisting of controlled suction through an intercostal catheter brings prompt expansion of the lung and evacuation of the blood. Early active treatment is important to avoid the problems presented by tension pneumothorax (figure 2) or clotted hemothorax (figure 3) and trapping of the lung in a collapsed state.

Case 2. J. T., a 46-year-old white man was crushed between the bumper of an automobile and a wall. He was severely dyspneic and cyanotic on arrival at the hospital. The admission x-ray film showed multiple rib fractures, fracture of the left clavicle, and left pneumothorax with severe shift of the mediastinal structures to the right (figure 2a.) Treatment was begun within an hour after the injury and consisted of (1) suction applied to a catheter inserted in the third interspace in the midclavicular line, (2) Novocain block of the 12 intercostal nerves on the left, (3) nasotracheal catheter suction on 4 occasions during the hospital stay. Im-

proved x-ray film appearance of the chest two days after injury (figure 2b) was correlated with great improvement clinically. Figure 2c shows the condition of the chest twenty-seven days after injury at which time the patient was clinically well and doing light work at home.

In this case, the simple measures mentioned previously brought dramatic improvement and led to the ultimate attainment of a good clinical result.

Case 3. M. H. is a 22-year-old man in whom left hemothorax developed as a result of an injury in August 1952. Blood was aspirated from the chest occasionally but never completely. This blood clotted, became organized, and was gradually converted to mature scar tissue. When he was seen in March 1953, the severe contraction of the left hemithorax and trapping of the lung were obvious. Decortication was performed. The entire visceral and parietal peel were removed. The lung expanded well to fill the hemithorax. Figure 3a was taken just prior to operation. Figure 3b is an immediate postoperative film.

The fragile vascular spleen is frequently damaged with chest trauma. Hemorrhage tends to be continuous and serious when the capsule is lacerated together with the pulp. If the capsule remains intact but the pulp is lacerated, delayed hemorrhage, particularly within the first three weeks after the injury, is possible. The treatment is splenectomy.

The liver is similarly liable to fracture and hemorrhage. In addition, the escape of bile into the peritoneal cavity may complicate the problem. In such cases, the treatment is debridement of devitalized parenchyma, control of bleeding points, and drainage of the area.

The kidney may suffer contusion or laceration in a chest injury. Bleeding occurs, however, in a comparatively closed space and has a greater tendency, therefore, to be self-limited than is true in the case of wounds of the liver or spleen. Emergency treatment consists of supportive blood transfusion, and early operation is only rarely necessary.

Traumatic pancreatitis is diagnosed by the elevated serum or urine amylase and is, perhaps, best treated by nonoperative means as with acute pancreatitis of undetermined etiology.

Damage to the heart is common and varies from transient pericarditis to severe contusion and even rupture of the myocardium. Damage is detected and progress followed by serial electrocardiograms, as well as repeated physical examinations. Patients with evidence of myocardial damage are treated with rest, as one would treat a patient with coronary thrombosis. There would seem to be, however, little place for the use of anticoagulants in this circumstance. Cardiac tamponade may occur early due to active bleeding or two to three weeks later as a small amount

Fig. 4a (left). Immediate preoperative portable anteroposterior film of the chest. *b* (right). Portable anteroposterior chest film immediately after open pericardiotomy. Catheter in communication with pericardial space but not in contact with the heart.



Fig. 5a (left). Film taken shortly after injury. *b* (right). Film taken two years after injury. Residual traumatic aneurysm has been resected and replaced with an ivalon prosthesis. (Photograph presented with permission of C. R. Hitchcock, M.D., chief of surgery, Minneapolis General Hospital).

of blood in the pericardial sac by hemolysis increases its osmotic pressure and causes a shift of fluid into the sac in the manner that a subdural hematoma increases its volume. One should, therefore, be alert for the classic signs of increased venous pressure, falling arterial pressure, paradoxical pulse, and increased cardiac silhouette on the x-ray film. The heart tones are muffled in a typical case, but this is an unreliable sign in our experience. Paracentesis should be performed for relief of symptoms and may be lifesaving. Open pericardiotomy through the bed of the left fifth costal cartilage with evacuation of the liquid and clotted blood and postoperative suction drainage is indicated if tamponade recurs. This procedure appeals to us as a simple, safe, and somewhat more certain method of evacuating the pericardial space and controlling bleeding points.

Case 4. M. D., a 46-year-old man, suffered a steering wheel injury of the chest and a fracture dislocation of the head of the right femur in an automobile accident. He was severely dyspneic, cyanotic, hypotensive, and mentally clouded when admitted to the Minneapolis

General Hospital. Adequate ventilation was regained by correcting left pneumothorax with intercostal catheter drainage, and a tracheotomy was performed. Approximately two weeks after injury, the patient developed the classical signs of cardiac tamponade. Figure 4a is an immediate preoperative portable anteroposterior film of the chest. Figure 4b was taken just after open pericardiotomy and removal of 700 cc. of old blood. The catheter has been sutured in place in communication with the pericardial space but not in contact with the heart. There was no recurrence, and recovery was complete.

Of the great vessels, the aorta is the one most commonly injured. It tends to tear at a point just distal to the left subclavian artery. The common explanation for this is said to be that the aorta is fixed in this area by the ligamentum arteriosum and upper extremity vessels. It may be that the narrow, tough, unyielding left vagus and recurrent laryngeal nerves provide the fulcrum over which the aorta is fractured. In the past, we could offer, in addition to supportive blood transfusion, little more than prayer. However, laboratory experience with the method of bypass of the occluded descending thoracic

aorta pumping oxygenated blood from the left atrium to the femoral artery recently gave us courage to operate with near success upon one case of acute rupture of an aneurysm of the descending thoracic aorta. It seems only logical that this method will be applied successfully to traumatic rupture of the thoracic aorta.

Case 5. G.D., a 15-year-old boy, was in an automobile accident in which he sustained mild head and kidney injuries and more severe trauma to the chest. X-ray film evidence of a mass developed in the apex of the left chest. Physical examination revealed a bruit in this area, signs of coarctation of the aorta (hypertension in the arms and hypotension in the legs), and an acute left ventricular strain pattern on the electrocardiogram. These signs gradually subsided over a period of one month. Figure 5a was taken shortly after the accident. Figure 5b was taken two years after injury. The residual traumatic aneurysm was resected and replaced with an aylon prosthesis.

Fracture of the trachea causes an air leak to the soft tissues, and, if the fracture site is separated sufficiently to enable the peritracheal soft tissue to fall in, respiratory obstruction occurs. Air leak to the mediastinum may cause compression of the low pressure vena cavae and pulmonary vessels with consequent circulatory failure due to poor filling of the heart. Immediate tracheotomy and passage of the tube beyond the area of tracheal tear may be lifesaving by re-establishing the airway and decompressing the mediastinum. Fracture of a major bronchus causes a pneumothorax and an air leak which cannot be overcome with intercostal catheters. Nevertheless, the catheters prevent or relieve a tension pneumothorax and are essential emergency measures to maintain life until definitive treatment can be undertaken. After the immediate threat is removed, fracture of the trachea or a major bronchus is best treated by early operation and primary repair of the laceration. This solves the immediate problem of air leak or respiratory obstruction and prevents the later complication of tracheal or bronchial stenosis.

Aside from the problem of injury to the various organs housed within the rib cage, we are concerned with the disturbance in the physiology of respiratory function caused by major nonpenetrating injuries of the chest.

Normal respiratory function resolves itself into two parts: (1) ventilation of the pulmonary alveolus and (2) gas exchange at the alveolocapillary junction. While there may certainly be disturbance in gas exchange due to parenchymal edema and hemorrhage in areas of contusion and laceration of the lung, the greatest disturbance in respiratory function results from the effect of trauma upon the mechanics of ventila-

tion. Therefore, for the purpose of this presentation, disturbances at the alveolocapillary interphase will be disregarded.

The normal movement of air in and out of the lungs depends upon: (1) the integrity and mobility of the thoracic cage and diaphragm, (2) elasticity and distensibility of the lung, (3) an intact pleura, and (4) a clear airway.

Each of the foregoing factors must be considered individually as we approach the problem of correcting disturbances in ventilation associated with chest injuries:

1. Integrity of a mobile thoracic cage and diaphragm involves: (a) sufficient rigidity of the chest wall to prevent any paradoxical motion under physiologic pressures, sufficient volume to allow adequate exchange, and sufficient mobility for expansion in all diameters; and (b) a good mobile capacity of the diaphragm, for, in quiet breathing, this muscle is said to account for 60 per cent of the total air ventilated.

Clinically, after injury with multiple rib fractures, we often see loss of rigidity and paradoxical motion of the chest wall on respiration. This paradoxical motion serves to increase the physiologic dead space by shuttling air back and forth between that portion of the lung subadjacent to the area of "flail chest" and the remainder of the lung. Perhaps, of equal importance, paradoxical respiration acts as a handicap to effective cough. The canvas rib belt or adhesive strapping serves to minimize the paradoxical motion. Measures aimed at stabilizing the chest wall by use of an external traction apparatus have long been standard practice. However, it has been our experience that, if we direct our efforts toward correcting the other more easily controllable alterations affecting ventilation, the use of an external traction apparatus is rarely necessary. Any advantage of external traction is probably outweighed by its disadvantages. One disadvantage is that the apparatus and dressing prevent easy access to a portion of the chest for physical examination and nursing care. Another and more important disadvantage is that the attachment of an apparatus of any kind to a patient tends to discourage his being turned frequently, and we lose, as a result, the aid of gravity in clearing bronchial secretions.

Effective restriction of mobility of the chest wall is imposed by the involuntary spasm of muscles in response to pain. In the patient with severe embarrassment of respiration, opiates are to be avoided because of their depressant effect upon the action of the bronchial cilia, the cough reflex, and the respiratory center. Pain in this situation is ideally and simply controlled by

paravertebral intercostal nerve block depositing 5 to 10 em. of 1 per cent procaine just inferior to the angle of each affected rib plus one or two ribs above and below those affected. It is a relatively simple bedside procedure to block all the intercostal nerves on one or both sides. The relief of pain ends splinting, with the result that the depth of respiration is increased and cough is no longer suppressed. This is a rewarding procedure in that the clinical improvement is often dramatic, and even the most undemonstrative patient cannot conceal his gratitude. In most instances, the Novaeain block brings relief which far outlasts the anesthetic effect and frequently only a single injection is required.

The diaphragm is the single most important respiratory muscle. We must take every step to remove handicaps to its freedom of action. The aforementioned Novaeain intercostal block contributes a good deal by the relief from splinting of the diaphragm due to pain. Abdominal distention due to adynamic ileus associated with the chest injury or reflecting a concomitant abdominal injury may seriously impair diaphragmatic motion. Since abdominal distention caused by ileus is much easier to prevent than to correct after it is established, the prompt early placement of a nasogastric tube is important in preserving mobility of the diaphragm and, in addition, is good first aid treatment of possible but as yet undiagnosed intra-abdominal injury. The gastric suction should be maintained until active bowel sounds are present.

2. In normal ventilation, the lung must be distensible so that the lung volume can increase, and it must be elastic to permit passive recoil during expiration. After an injury, the factors of distensibility and elasticity of the lung are disturbed in areas of contusion and hemorrhage into the parenchyma. Such changes are not easily or rapidly reversible. We will, therefore, accept this alteration and extend our efforts in other more profitable directions.

3. An intact pleura is essential for efficient ventilation of the lung. In a pneumothorax, any expansive force is partially lost on the elasticity and distensibility of the air in the pleural space.

A pneumothorax is almost always present in a serious chest injury and is readily seen on the upright x-ray film of the chest. The importance of taking the film in the upright position is worthy of emphasis. On a flat film, considerable fluid may be layered out posteriorly and air anteriorly with the lung suspended between these two and with lung markings reaching the chest wall laterally. Sizable pneumohemothoraces have been overlooked on the flat film by

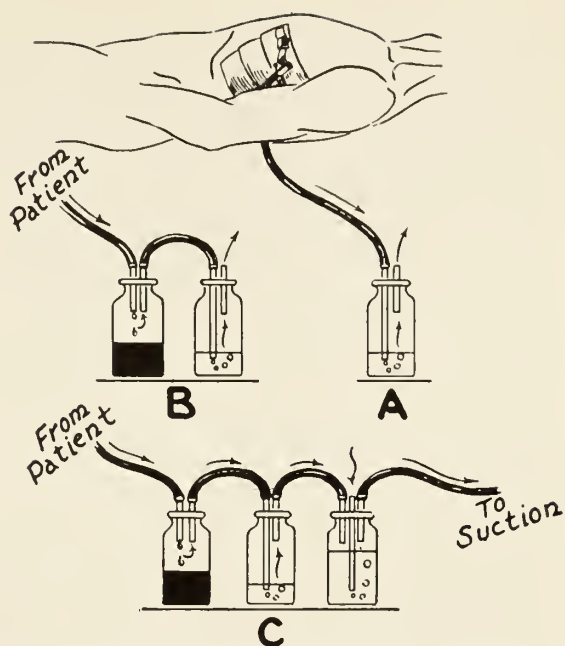


Fig. 6a. Simple water seal drainage. (b). Simple water seal drainage with trap bottle to collect secretions. (c). Three bottle suction.

even the most experienced physician. If it is felt unwise to secure an upright film because of the patient's precarious condition, the lateral decubitus film will serve as an excellent second choice in demonstrating the presence of a pleural complication. In management, we will be guided by the general rule that the pleural space must always be kept empty, and one of the first acts of treatment should be to place a catheter in the pleural space and apply suction (figure 6). The third interspace in the midclavicular line is a convenient area to place the largest urethral catheter that will pass through the available trocar. This catheter removes the air readily but is not always successful in removing the blood. In the latter circumstance, a second catheter should be placed in the sixth or seventh interspace in the midaxillary line.

This procedure is illustrated in figure 6. Simple water seal drainage is shown in figure 6a. A column of water equal to the negative intrapleural pressure prevents aspiration through the catheter to the chest cavity. For this reason, the water seal bottle must be well below the level of the patient (floor level is usual). As positive intrapleural pressure on exhalation becomes sufficient to overcome the column of water between the tip of the water seal tube and the surface of the water, air and fluid in the pleural space are discharged into the water seal bottle. Since it is desirable to have as little resistance as possible to egress from the pleural space,

the tube should be no more than 1 cm. below the surface of the water in a gallon bottle.

Figure 6*b* illustrates simple water seal drainage with a trap bottle to collect secretions and, thus, prevent change in the fluid level and consequent change in the resistance to outflow through the water seal.

Three-bottle suction is portrayed in figure 6*c*. Trap bottle, water seal, and controlled negative pressure suction bottle comprise the series. Suction is applied to the third bottle by a Stedman-type pump or the common laboratory water suction, which is available in all hospitals. The tube, which is open to the atmosphere, is placed 14 cm. below the surface of the water. Thus, we know that when the suction apparatus pulls air from the atmosphere through this tube, we are maintaining 14 cm. negative pressure throughout the system. Fluid aspirated from the chest drops into the trap bottle, and air leak is manifested by bubbling through the water seal bottle. The water seal bottle also prevents aspiration to the pleural space if the suction pump should fail.

In addition to assisting ventilation by allowing the greatest possible expansion of the lung, catheter drainage indicates the amount of blood lost in the chest cavity and also tells if and when the bleeding or air leak ceases. With the knowledge that while the chest catheter is in place, a tension pneumothorax will not develop and blood will not silently accumulate in the chest cavity, the physician is permitted a much less troubled sleep.

4. The fourth factor in proper ventilation of the lungs is a clear airway. The maintenance of a clear airway is normally achieved by ciliary action, the cough reflex, positional change and postural drainage, bronchial peristalsis, and collateral respiration. The cilia clear the airway by propelling a blanket of mucus along the tracheo-bronchial tree. Foreign bodies are moved toward the larynx on this blanket. Ciliary action is impaired by drying, by drugs which thicken or thin the mucus, and by anesthetics. Thus, we must keep the patient's atmosphere humid, avoid drugs of the nature of atropine or potassium iodide, which alter the character of the mucus, and avoid opiates which depress the cilia.

Coughing is essential to the maintenance of the airway and depends upon the integrity of the cough reflex along with an ability to build up an adequate volume and pressure behind a closed glottis and then release it suddenly. Relief of pain, stabilizing the chest wall, and correcting pleural complications all contribute to a more effective cough. Most important of all, patients must be informed of the reason for

coughing and raising mucus and then be encouraged frequently by the nurse and physician to do so. In those cases in which the patient cannot bring himself to cough, suction applied to a catheter passed through the nose and into the trachea removes secretions and teaches the patient that he can indeed cough (figure 7).

A catheter possessing a gentle curve passes most readily through the larynx. Plastic disposable catheters especially designed for this purpose are available. However, an ordinary urethral catheter serves very well. The catheter is passed to the posterior nasopharynx and advanced quickly synchronous with inspiration until the larynx is passed. Success will be the reward of persistence. Signs indicating that the catheter is properly placed are apparent when: (1) the patient coughs due to the presence of the foreign body, (2) he is unable to speak above a whisper because the tube passes between the vocal cords, and (3) air may move in and out of the catheter as the patient breathes.

Suction should be maintained for only brief periods and is stopped by removing the thumb

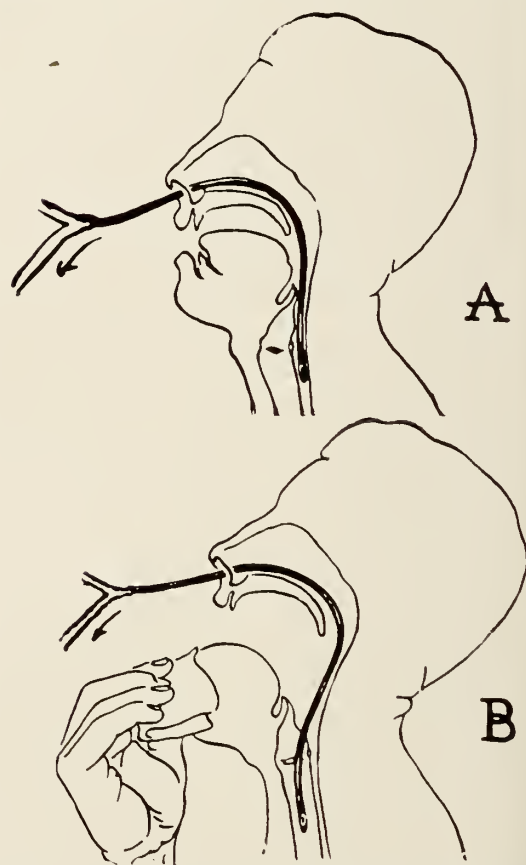


Fig. 7*a*. Catheter entering the esophagus and illustrating the advantage of an anterior curve in the catheter tip. (*b*). Holding the tongue forward occasionally aids in passing the catheter to the trachea.

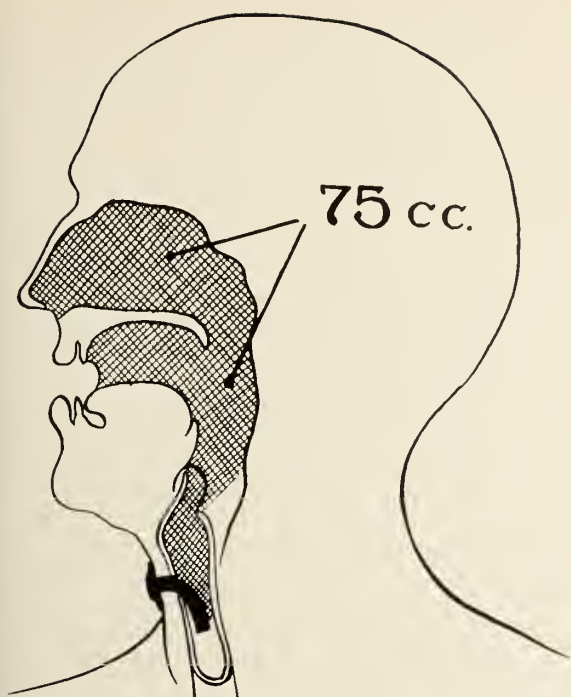


Fig. 8. Tracheotomy showing anatomic dead space reduced by about 75 cc.

from the open arm of the Y connector. The catheter is left in place during these periods of rest. At each session, the intermittent aspiration should be continued until there is no further return. If the direction of the catheter's curve is known, it can be passed into either main bronchus.

The effect of gravity on drainage of bronchial secretion is well known and accounts for our rather routine order to turn patients frequently.

A very important mechanism in maintaining a clear airway is collateral respiration, which allows air from a well-ventilated lobule of lung to pass into an adjacent lobule whose bronchus may be plugged. With the accumulation of air peripheral to the block, the cough again becomes effective in clearing the mucus. In cases in which mucus or blood blocks a bronchus and causes atelectasis of an entire lobe or lung, collateral respiration cannot play a part in relieving the obstruction. In this circumstance, the body must rely upon the action of the cilia and the pull of gravity to dislodge the blocking agent. These two mechanisms are often ineffectual and always slow enough so that aspiration of the obstructing mucus is essential. This may often be accomplished by nasotracheal suction (figure 7), and this bedside maneuver should be tried as soon as the diagnosis is made. If this method fails to accomplish re-expansion of the atelectatic lung, bronchoscopy would ordinarily be considered as the next step. If bronchoscopy is not

available, however, or if repeated bronchoscopies are necessary, a tracheotomy should be provided in order to clear the tracheobronchial tree of mucus by suction as often as necessary.

From several viewpoints, a tracheotomy is an extremely useful procedure in patients with chest injuries. It has some disadvantages, but these are outweighed in importance by its advantages (figure 8).

Advantages:

1. Anatomic dead space is reduced by approximately 75 cc.

2. Resistance to air flow through the nasopharynx and larynx is avoided with the result that: (a) tendency to paradoxical motion of the chest wall is minimized and (b) air leak from the lung may be decreased.

3. Tracheal secretions may be aspirated as frequently as necessary by the nurse.

Disadvantages:

1. Effective cough is lost and the patient must rely upon his attendants to keep his airway clear.

2. The warming and humidifying action of the nasal passage is lost, so that secretions tend to dry and water loss may be excessive.

Indications for tracheotomy should be liberal, but we must recognize that as we perform the tracheotomy we assume certain obligations to the patient. Among these are removal of tracheobronchial secretions, prevention of excessive drying of the respiratory tract, and replacement of fluid lost by virtue of the tracheotomy.

SUMMARY

When a patient with an acute chest injury is seen in the emergency room, an attempt should be made to maintain circulation by replacing blood loss as may be indicated by signs of shock and controlling obvious points of hemorrhage. Simultaneously, the factors concerned with the mechanics of ventilation are considered. Of the various measures discussed, placement of the intercostal catheter, tracheotomy, and intercostal nerve block are the procedures most often employed as lifesaving measures in the emergency room. Frequently, these are the only measures necessary to a good result. Laceration of the liver or spleen is so commonly a part of any chest injury that we must be extremely sensitive to signs of intra-abdominal bleeding or evidence of blood loss beyond that which is estimated from the chest x-ray film or suction trap bottle to have been lost into the chest. If there is even the slightest question of intra-abdominal bleeding, the patient's cause is best served by exploratory laparotomy through an upper abdominal mid-line incision.

The Tuberculin Test

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FORTY YEARS AGO, a member of the Bureau of Animal Industry made the following statements to a veterinary college class: "We are going to tuberculin test all the cattle in the United States. We are going to eradicate bovine tuberculosis." To envision the fulfillment of such a stupendous undertaking at that time was beyond our comprehension. Yet, in one decade, practically all the cattle had been tested at least once. In two decades, 95 per cent of the counties were accredited. In other words, we had reduced the incidence of reactors to less than 1/2 of 1 per cent.

Over 176 million tests had been made, and more than 3 million reactors had been found and slaughtered. In forty years, the disease has been practically eradicated or, at least, reduced to the minimum. For the fiscal year of 1956, over 9 million cattle were tested, with an incidence of infection of only .15 of 1 per cent. In 1917, the incidence of infection was 3.2, increasing to 4.9 in the early twenties and gradually decreasing in the succeeding years.

My personal experience as a student assistant in tuberculin testing had been confined to the old time consuming subcutaneous method whereby 1 veterinarian could test only 40 to 50 head of cattle in twenty-four hours. Therefore, the goal outlined in the statement quoted seemed somewhat exaggerated to me. But, the speaker had predicted that a new, more reliable, and much faster test would be available. He was, of course, referring to the intradermal test which had survived a period of experimental checks and, since 1920, has been a widely accepted method.

Every disease control program must have many good reasons for its existence, and this one was certainly no exception. Tuberculosis of the food producing animals was at one time the most serious disease with which the American farmers were confronted. The meatpacking industry was forced to condemn and destroy about 10 per cent of their swine and beef carcasses because of tuberculosis. Consequently, they either had to

buy livestock at a cheaper price or subject it to inspection. An economic problem existed affecting both buyer and producer.

Cattle breeders and dairymen were becoming more aware of the various dangers of the disease and the benefits of disease-free animals both from the beef and milk production standpoint. Medical men and public health authorities were cognizant of the fact that milk from infected cattle was causing appreciable human infection and loss of life, especially in infants and children. Forty years ago, it was estimated that 11 per cent of all infant tuberculosis was of bovine origin.

Realization of these facts resulted in the organization of the cooperative campaign for the control and eventual eradication of the disease. Led by the Bureau of Animal Industry and joined by the several state livestock sanitary officials, groups of livestock breeders, and others interested in the livestock industry, a plan of operation was developed.

In order to facilitate the testing, definite plans worked out by the Bureau had to be accepted. The first involved choice of a uniform type of tuberculin and a standard dosage. The second concerned the matter of an indemnity to be paid by the federal government for infected cattle and to be matched by the cooperating state, as well as other incidental expenses and activities to be carried out by mutual agreement with counties and other governmental agencies. The meat packers added their support to the program by offering a premium of \$.10 per hundred-weight on swine originating in an accredited county.

Preliminary testing had been confined largely to purebred herds on an individual herd basis with the idea of reaching accredited status. However, in a very short time, serious consideration was given to broadening this plan to a definite region known as the area plan. The county was used as a unit or area of operation, and counties were encouraged to employ a county veterinarian. All counties in all states did not adopt this idea. However, the work was done by federal or state-employed veterinarians who were assigned temporarily to a county where men were not regularly employed. To me, the area plan has

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been a very significant and vital point in the gradual eradication of bovine tuberculosis. With this program, it has been possible to test *all* the cattle in *every* county. The idea of having a local man available and responsible for the work in his area was important. For operational purposes, we divided the counties by townships and tested each as a unit. We started in one corner of a township and stopped at every farm on every road until every herd in the township was tested. This plan was followed until the county was thoroughly canvassed. We generally employed a local helper, a person acquainted in the area, who not only assisted in handling the cattle for testing but notified the cattle owner on the previous day that we would be there and that he should have his animals properly confined. I would like to state that while these plans worked, they were not always as simple as they may sound. In the first place, a small percentage of owners were not at all cooperative, and a considerable amount of time was required to convince the farmers of the efficiency of the program. In some instances, a sheriff and his deputies were necessary to complete the testing of recalcitrant owner's cattle. It was very discouraging to be met at the farm entrance by a belligerent owner with defiance in his eye and a shotgun in his hand. At that time, many farms were not well equipped to handle the cattle; barns and fences were often inadequate; and temporary facilities were often *too* temporary.

The cattle in many instances were none too cooperative either! Weather conditions could often ruin the best laid plans. Roads in the early days were quite often impassable. If conditions prevented working on planned injection dates, the work could be postponed, but it was considered a cardinal sin not to make the readings after the cattle had been injected. We walked many miles through rain, mud, and snow to complete the job. Sanitary surroundings on many farms were far from admirable, and, in the case of infected premises, we were often obliged to enforce cleaning and disinfecting practices by withholding indemnity payments until the job was completed. A minor problem in some localities, especially in small towns and suburban areas, was the one-cow herd. They were hard to find, but the local lay helper proved his value in such situations. This factor was and continues to be important, as the family cow was quite often infected. We were as diligent in locating and testing the single animal as the large herds. To err is human, and we, no doubt, made many mistakes. We have probably condemned some noninfected cattle, and we may have passed

some reactors. However, the ultimate results seem to indicate that a highly satisfactory level of performance was acquired and maintained.

Regularly employed veterinarians soon became very efficient in making injections and readings. Herd histories and physical conditions as well as keen observation of sanitary surroundings, food, and water supplies were significant. Post-mortem reports on reactors helped the operator judge future readings. Years ago, when the disease was more prevalent, we considered 10 per cent of cases with no visible lesions a good record. However, as the infection decreased, the percentage of cases without visible lesions increased. While this fact might cause the most experienced operator some embarrassment, it is not unusual, and we have continued to use our judgment and remove the animal from the herd. In more recent years, we have become more tolerant and do, on occasion, hold an animal in isolation for retests before making a final decision. Some generalized cases did not react to tuberculin but were often removed from the herd because of clinical symptoms observed by the veterinarian. This was especially true in herds with persistent infection where obscure but certain infectors were in evidence.

When an infected herd was found and reactors removed, the herd was subjected to 2 sixty-day retests at least, more if infection persisted. In many cases, 6 to 12 retests were necessary to find and remove the last victim. These herds were then generally placed on an annual test basis until all possibility of further trouble was eliminated. By doing this on each area retest, a thorough follow-up was accomplished.

The 2 tests formerly used were the subcutaneous and the ophthalmic. The subcutaneous was a thermal test. After 3 preinjection temperature readings on each animal at two-hour intervals, a quantity of tuberculin was injected subcutaneously. Beginning eight hours after the injection, temperature readings were resumed at two-hour intervals and recorded on a chart, together with the preinjection readings and proper identification of each animal. Five postinjection temperatures were recorded. Reactions were indicated by characteristic elevations in temperature (rainbow-shaped on the chart) beginning at the eighth hour and increasing 3 to 5° at about the twelfth to fourteenth hour and then gradually receding. No variation between the pre- and postinjection temperatures constituted a negative reaction or absence of infection.

The ophthalmic test was used to some extent years ago, both in conjunction with the subcutaneous and the intradermal and also alone. It

was never considered very efficient and, because of its many bad features, was finally discontinued. The intradermic test is made by injecting one minim of specially prepared tuberculin between the layers of skin of the caudal fold. Reactions are indicated by a noticeable swelling at the injection site. These swellings may be small as a pea, hard and circumscribed, or as large as a hen egg. They may be soft and doughy and diffused, with a feeling of unusual warmth, but with no particular line of demarcation.

Routine testing can and does become rather tiresome and boring. Were it not for the sincere dedication to the ideal of eradication uppermost in the minds of experienced operators, the program would not have been so successful. However, complacency has no part in any disease-control program. Just when we seem to have sunk into an indifferent routine, we discover a new and exciting case and with it a new surge of enthusiasm for the work as well.

As the disease has diminished, the period of accreditation has been extended. At present, when the disease rate is less than 1/10 of 1 per cent, the period for a complete retest is six years. In some areas, even on some farms, that could be too long. We try to keep closer observation on those areas, but our greatest fear is that somewhere, sometimes an unusually virulent infector may appear to destroy many animals and years of hard work. Thus, we must forever be on the alert.

Some of the complications encountered in our program were due to infection from other than bovine sources. Swine and avian infectors were quite common in some areas, doubtless causing false reactions on occasion, yet, such pronounced reactions that the operator had to condemn the animal.

Avian infection was found to be quite extensive in some areas of Illinois, and swine infection was correspondingly high. There is no known type of swine tuberculosis, so that species was either infected by the avian, bovine, or human type. In 1928, in a survey testing program in one central Illinois county, 22 per cent of the poultry over 1 year of age reacted to the intradermal test. In another survey made on poultry and swine on the same premises in one county, swine infection was found to exist on only one farm where poultry infection was not found, and, in this particular instance, the swine were new additions.

Field experience indicates that avian infection can be contracted from the human being as well. Gross lesions have been found in poultry on premises harboring known cases of human tuber-

culosis. While not proved, it would seem possible that a chain of infectors from the human being through the avian and swine to the bovine and thence back to the human being can exist.

European studies have revealed that the bovine type is sometimes responsible for open pulmonary tuberculosis in man, and that man can, in turn, spread the infection to the cows he milks and cares for. However, if the type of infection in man is of human origin, the danger to the bovine is meager.

A report from Sweden blames a woman worker on a large dairy farm as the infector of 47 head of cows. This woman was suffering from pulmonary tuberculosis, and the disease in the cattle developed some ninety days after she was employed. In this instance, detailed laboratory tests proved conclusively that the infection was of human origin.

Just this last year, a dairy herd in one of our Illinois counties suddenly disclosed several reactors. On following through, it was found that the herd owner had an active case of tuberculosis, and he was immediately hospitalized. Typing was inconclusive at last report.

One result of this incident was the adoption of a resolution by the Executive Committee of the Illinois Tuberculosis Association, which recommended that it should be mandatory for all persons in contact with tuberculin positive cattle to be tuberculin tested themselves, and, if their reaction were positive, they should have chest x-ray films taken and any other diagnostic tests necessary to determine the presence of active tuberculosis.

Our health and agriculture departments have been notified of this action and have agreed to cooperate in fulfilling the recommendation. Perhaps some valuable and interesting information may result.

We have encountered several instances in which swine were responsible for a bovine outbreak. Probably one of the most interesting cases of swine as bovine infectors was demonstrated in LaSalle County, Illinois, a few years ago. In a herd of 35 head of Guernsey cattle which had shown no infection since 1941, 17 reactors appeared on the annual test; 16 head showed lesions of tuberculosis on the post-mortem report; and 6 head were condemned as generalized cases. These cattle were all young, between 2 and 10 months of age. On the first sixty-day retest, 6 more reactors were found; 2 of them were condemned. All 6 were under 10 months of age. When the first reactors were found, everyone concerned was quite interested in finding the source of this unusual occurrence.

and, after some investigation, the swine herd was regarded with suspicion. All breeding swine were subjected to the intradermal test with bovine tuberculin, and more than 40 of the 80 head reacted. The entire swine herd was sold for slaughter, and all subsequent retests on the remaining cattle have been negative. It was learned that these young cattle had been confined with the swine herd during the spring and early summer. The adult cattle on the farm had never been in contact with the swine herd or with the young cattle which reacted.

Just a few years ago, we discovered 2 reactors in a cattle herd of 4. There had been no previous infection on the farm. We held the animals for retest, and they reacted again. They were sent to slaughter but showed no macroscopic evidence of tuberculosis. We tested the poultry and the brood of 4 sows on the farm. Three of the sows reacted; 1 was negative. Investigation revealed that the 3 sows had been purchased the previous year at a sale some distance away. The poultry were negative.

Swine and avian exposure no doubt cause some of the atypical reactions and account for a percentage of the cases without visible lesions. Yet, some are so impressive that they demand radical action. Veterinary philosophy inclines toward the preventive phase of disease control. We would much rather remove a suspicious animal from the herd than take a chance on leaving future potential infectors.

Our friend, Dr. J. A. Myers, once said: "In human tuberculosis, many problems which are today considered controversial have already been solved by the veterinary profession."

I am not sure of all the specific problems to which the doctor refers, but the fact that we test all the cattle, remove them from the premises, and conduct a thorough follow-up are most important.

These points pose an example for all workers in the tuberculosis field whether veterinary, medical, public health, nursing, or volunteer. Our task may appear comparably simple and easy, but I can assure you it never has been or ever will be.

In the first place, organization with dedicated leaders was necessary and an extensive educational program as well. Uniform methods of operation with a standardized tuberculin in the hands of trained personnel who were determined to accomplish the job at hand were of prime importance.

As an active member of our county and state tuberculosis associations for several years, I have had ample opportunity to observe the aims, am-

bitions, and problems of the professional and voluntary workers. As is the case in any organization, there exists an honest difference of opinion regarding the best methods necessary to achieve the goal—the eradication of tuberculosis.

Perhaps my viewpoint concerning the efficiency of tuberculin testing is somewhat different from that of a medical man, but it would appear that we could learn from one another. We know what causes the disease, but we have no acceptable preventive to date. Medical and surgical treatment have reached a new high in efficiency, reducing hospital confinement appreciably. I will not quote statistics; they are available to all. It appears then that the discovery of unknown cases is the most difficult problem for both doctor and veterinarian. Unless we use all the tools at our command, we are not taking advantage of our opportunities, and, certainly, one of the simplest tools is that of the tuberculin test. I have noticed in recent years the increased interest shown by various persons in the value of the test and a more concerted effort on their part to stimulate others to use it more carefully as a case-finding tool. I have tried to listen objectively to all the arguments pro and con, but I am convinced that if this tool were used wisely and diligently, we would reap a harvest of previously undetected cases. Certainly, the results of the bovine campaign have proved this point, and I can think of no obstacles more formidable than those the veterinarian has conquered.

I believe the medical profession and other agencies should agree on a type of tuberculin and standard methods of administration and observation. The Bureau did this for us and avoided much confusion. I believe the general practitioner lacks interest or is indifferent to the disease and the part they can and should take in the eradication program. I have had physicians tell me that we have had and always will have tuberculosis. I'm quite sure that these pessimistic physicians are very much in the minority, but, since this is a medical problem, it will never be conquered without the wholehearted support of that profession.

Someone once said that to permit the death of people from a preventable disease is a crime against humanity. I don't presume tuberculosis to be a wholly preventable disease at this time, but, certainly, early case finding will prevent thousands of deaths, untold suffering, and save millions of dollars.

It seems that a united effort between our professional and voluntary groups could develop a concerted program of case finding through the use of the tuberculin test. Surely, a majority of

medical men would be interested in this eradication program if they were properly indoctrinated from a reliable source. If we are to succeed in our campaign, our educational endeavors must start at the top with the medical profession. The family physician must play a key role. He, of all people, wields the most influence with his patients on medical problems. Without his interest and advice no disease-control program can succeed. It appears to me that the first job of our voluntary associations is to enlist the cooperation of every physician, acquaint him with the problem at hand, and encourage him in any way possible to use the tuberculin test in his private practice as a diagnostic agent and make plans for area testing programs where feasible. In areas with organized medical societies, they should take the lead in perfecting some type of working group dedicated to finding every case of tuberculosis in their respective areas.

This undertaking may appear to be an impossibility, a too comprehensive plan, and yet, in the process of total eradication of tuberculosis, it may become necessary to do more than we need to do. One sure way of failing to eradicate this disease is to do less than is required. I am not unmindful of the other case-finding methods available, and I most certainly encourage their unlimited use. However, in view of the recent adverse criticism of radiation from x-ray (warranted or not), it seems a most appropriate time to use the most basic of all methods—the skin test.

Sometimes we cannot see the forest for the trees seems a classic example of the truth and reminds me of the story of the boy and the puzzle. A father gave his small son a jig-saw puzzle of a map of the world, thinking the task of putting it together would keep him busy for a long time. The father was surprised to find that the boy did the job in a comparatively short time and asked him how he did it. The boy replied: "It was easy, there is a picture of a man on the other side, I just put the man together and the world turned out all right."

Recently, a local pediatrician related an interesting story. A 3-year-old girl developed some enlarged lymph nodes in the cervical area. They were not sensitive but noticeably enlarged and rather hard. After several weeks of medical and antibiotic treatment, no improvement was visible. On an intuition, the doctor used the skin test for tuberculosis and got a positive reaction. The nodes were surgically removed, and biopsy proved them to be tuberculous. This is just another example of finding the unknown case by using the intradermal test as a routine diagnostic

procedure. A complete follow-up of contacts has not been made at this time, but it is quite enlightening to discover what results the small red spot on a child's arm may eventually produce.

I believe physicians and nurses have done quite a lot of area testing in Minnesota with interesting and profitable results. A group of St. Louis physicians have also carried on a tuberculin testing program in St. Louis County, Missouri, with most gratifying results. Several Illinois counties are extending their school testing projects. In our city, the annual school health surveys, which formerly included the tuberculin testing of the first, fifth, and ninth graders, was extended to include the high school seniors. Several formerly unknown contacts were discovered, and one active case in a senior was disclosed. The additional cost was negligible in comparison to the results obtained. School surveys, as such, may not appear too productive, but they certainly make it possible to identify the areas in which follow-up work should be done. A map of our city was so pin pointed by our sanatorium director, as a result of the school survey, that it shows most clearly and graphically where the disease is most prevalent. Plans are being formulated to conduct a thorough case-finding program in this specified area. If this proves productive, other areas may likewise be canvassed.

Another phase of the use of the skin test which has received very little attention is the cost. From what I can learn, more active tuberculosis can be found much less expensively, especially in selected areas, by using this simple test. In some cases, mass x-ray film surveys exact a terrific cost with minimum results. I am yet to be convinced that a skin-test program in these same areas would not yield better results at less cost. I believe it should be tried and followed to the extreme potential.

Since tuberculosis is a very insidious disease, there is, no doubt, more complacency regarding its eradication. If it were half as spectacular as poliomyelitis, it may well have been much nearer eradication at this time. It seems rather ironic to me that we have done so much more toward eradicating tuberculosis from our bovine population than from human beings.

Mrs. Edith Backs, executive director of Washington County, Illinois, had a most interesting article in the January 1957 issue of *Everybody's Health*, entitled "Putting the Tuberculin Test to Work." I would like to quote her 13 reasons for using the test.

1. When tuberculosis strikes infants, it is often

quickly fatal. That is why parents and baby sitters should be tested.

2. Tuberculosis contracted during childhood may "go to work" during adolescence. That is why high school students should be tested.

3. Tuberculosis is the chief killer in the 15-year-age level. That is why *everyone* in this group should be tested.

4. Tuberculosis often disables for years. That is why middle-aged persons with family responsibilities should be tuberculin tested.

5. Tuberculosis may remain inactive for years only to go on the warpath during old age. That is why old people should be tuberculin tested.

6. Tuberculosis is especially troublesome when teamed with diabetes. That is why diabetic persons should be tuberculin tested.

7. Tuberculosis is very prevalent in many foreign countries. That is why returning military personnel should be tested.

8. Tuberculosis is contagious and communicable. That is why all contacts of a known case should be tuberculin tested.

9. Tuberculosis germs are not revealed by roentgenogram before they have done damage. That is why even those who have negative chest films should be tuberculin tested.

10. When someone in a household has become infected, others in it may have picked up the germs from the same source. That is why all in the home should be tested if one reacts.

11. Tuberculosis can do serious damage without causing symptoms. That is why those in apparently perfect health should be tuberculin tested.

12. Tuberculosis can strike anyone. That is why *you* should be tuberculin tested.

13. It is true that many who harbor tuberculosis germs will never have trouble from them. It is also true that no one harboring them is ever safe. That is why every reactor should have an annual chest x-ray film taken till he is 99½ years old.

Yes, x-ray films will detect tuberculosis early, but the skin test will find it much earlier and at less cost.

THE WORLD HEALTH ORGANIZATION will hold its eleventh annual assembly meeting in Minneapolis from May 26 through June 14. This is the first time the group has ever met in the United States.

In honor of the occasion, THE JOURNAL-LANCET is proud to announce that its June issue will be devoted to the accomplishments, objectives, problems, and needs of the World Health Organization. Articles on public health written by outstanding world health authorities will be presented.

Copies of the Special Issue will be distributed to representatives and delegates of WHO. These may be the only copies of an American medical journal to be found in doctors' offices, clinics, and hospitals in the far corners of the world.

Tuberculosis from Man to Animals

GEORGE D. MORSE, M.D.

Peoria, Illinois

IN THE UNITED STATES, the tuberculin testing of cattle and the universal pasteurization of milk have all but eliminated the danger of transmitting tuberculosis from animals to man. The reverse, however, is not true. Man's inability to adequately subdue the disease in his own species—although he is certainly equipped with enough knowledge to accomplish this job—means that susceptible animals live in constant danger of catching tuberculosis. This article then will consider principally the transmission of tuberculosis from man to animals. This is not a minor problem either from the public health or economic standpoint. Animals who contract tuberculosis from man can later pass it on to other animals and, thence, back to humans, thus acting as reservoirs of infection. Financial loss can be of considerable concern. Ask a dairy farmer who loses his whole herd without adequate compensation; or, ask a zoo keeper who loses an entire monkey colony.

Three types of tubercle bacilli must be considered: the human, bovine, and avian. Avian tuberculosis is quite common and is a serious disease in many species of animals and birds. Only a very few human cases have been reported in the literature, and most of these have not been proved. If avian tuberculosis exists in man, it is extremely rare, and transmission of avian bacilli from man to animals probably never takes place. Differentiation between the 3 types of tubercle bacilli existing in the warm-blooded animals is based partly upon cultural characteristics but mostly on the virulence test. The animals used in the virulence tests are the guinea pig, rabbit, and chicken. Frequently, the results of these tests are inconclusive (table 1).

The most common domestic animals which can be infected with tuberculosis are the cow, pig, dog, cat, horse, and chicken. Each of these will be discussed briefly. Either from reports in the literature or from personal knowledge of the author, the following is a partial list of additional animals in which tuberculosis has been known to

exist: guinea pig, rabbit, duck, goose, turkey, peacock, pheasant, canary, parakeet, parrot, guinea fowl, crow, goat, lamb, deer, fox, kangaroo, buffalo, mink, elephant, giraffe, striped gopher, rat, mouse, badger, gnu, antelope, wild boar, waterbuck, sparrow, squirrel, vole, baboon, lemur, orangutan, chimpanzee and monkeys of all varieties. Five groups will be discussed: wild animals, domestic animals, pets, laboratory animals, and animals in the zoo.

WILD ANIMALS

Several statements in the earlier literature that tuberculosis does not exist in wild animals in their natural state are not true. Tuberculosis has been reported in many species of wild animals. The sparsity of these reports can easily be attributed to the fact that a wild animal with tuberculosis is apt to become sick and incapacitated rapidly. It is more likely that it would succumb to some natural enemy before falling into a pathologist's hands. Incidence of the disease in wild animals would no doubt depend on how closely they were associated to man.

DOMESTIC ANIMALS

Cow. Much has been written about tuberculosis in cattle. The cow is susceptible both to the bovine and human type, but practically all cases occurring in cattle are due to the bovine bacilli. Pathologically speaking, the lung is the principal site of infection, although the liver, spleen, kidney, mucous membranes, udder, and mammary glands are frequently involved. The most common mode of transmission from cow to cow is thought to be by droplet infection through coughing or expired air. Bovine tuberculosis can

TABLE 1
VIRULENCE TEST

Type bacillus	Guinea pig	Animal Rabbit	Chicken
Human	+	?	O
Bovine	+	+	O
Avian	?	+	+

+ = susceptible

? = slightly susceptible

O = resistant

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be transferred from the cow to dairy workers, and, in turn, they can transmit it back to uninfected cattle. Even new herds can be infected in this manner, resulting in serious losses. The cow is susceptible to human tuberculosis but to a much lesser extent. With few exceptions, it is apparent that human tuberculosis in cattle is a rather benign disease. It is doubtful whether a cow suffering from human tuberculosis would be infectious to other cattle or man either through the milk or through close contact. But, the tuberculin test would be positive, and, since it is impossible to tell which type of tuberculosis exists, the cow must of necessity be destroyed. Personal communication from a former superintendent of a midwest sanatorium revealed an instance in which the garbage incinerator accessible to the sanatorium's dairy herd was thought to be the cause of many positive tuberculin reactions, and, when the situation was remedied by fencing, no more trouble of this kind was encountered. Recently, a patient was admitted to the Peoria Municipal Tuberculosis Sanitarium with minimal active pulmonary tuberculosis. His disease was discovered through a chest x-ray film taken because he was the tenant supervisor of a dairy herd which suddenly had developed an epidemic of tuberculosis. Unfortunately, it was never established whether he or the cattle had human or bovine tuberculous infection. However, it was assumed that it was bovine because of the extensive pathology found by the meat inspectors in the cattle that were destroyed. Bovine tuberculosis can be missed in a routine sanatorium examination because the bovine bacilli grow very poorly on the glycerinated culture media, which is almost universally used, and in which the human bacilli thrive quite well. It is suggested that guinea pigs should be used along with the cultures, since the guinea pig will be infected equally by both types. Whenever cultures of a patient's sputum are persistently negative, but guinea pig inoculations are positive, the bovine type of bacilli should be suspected. All dairy workers should have pre-employment x-ray films taken at regular intervals during employment. Whenever a tuberculosis epidemic occurs in a previously uninfected herd of cattle, all human contacts should be immediately x-rayed not only to see if they are the source of infection but also to see whether they may have contracted the disease from the infected cattle.

Pig. Swine are susceptible to all 3 types of tubercle bacilli. Tuberculosis in pigs is quite common, but the majority of cases are caused by the avian bacilli, which is due to the close

association of the swine in barnyards with chickens and other poultry. Eating untreated garbage, which frequently contains chicken entrails, is another source. Bovine tuberculosis in swine has become quite rare because of the corresponding rarity of cattle tuberculosis. Human tuberculosis does occur and is caused by eating human garbage. Transmission of tuberculosis from man to swine by personal droplet infection certainly occurs infrequently.

Dog. Tuberculosis in the dog is much more common than usually thought. Because of his close contact with man, human tuberculosis is far the most common type of disease, although he is also susceptible to bovine tuberculosis but rather resistant to avian. The disease in the dog is apparently of a mild nature with few symptoms, but pathologic reports of autopsy material leave no doubt that the dog with tuberculosis should be considered a dangerous pet. The fact that dogs have not been proved to have transmitted tuberculosis infection to humans is probably due to the fact that few people have ever realized that this is a possibility. Tuberculosis workers should consider all household pets whenever contact examinations are carried out.

Cat. Tuberculosis in cats is not common. Most reports of the incidence of the disease in cats have come from outside the United States, and, whenever investigated, the vast majority of cases were bovine. Experimentally, it has been shown that cats are rather resistant to the human strain but quite susceptible to bovine tubercle bacilli.

Horse. Tuberculosis in horses is quite rare, and, when it occurs, it is almost always caused by bovine bacilli. This rarity is not only accounted for by the decrease in cattle tuberculosis, but the incidence in horses was quite low even when tuberculosis in cattle was prevalent.

Chicken. All types of poultry are susceptible to avian tuberculosis but are totally resistant to the human and bovine type. Chickens apparently are the most susceptible, while turkeys, ducks, and geese are less apt to have tuberculosis. The human being plays no part in infecting the poultry by direct contact, but his inability to create preventive measures can certainly be considered an undesirable contribution, and any shortcomings in this matter can frequently result in financial loss to man, not only because of sick chickens but because of transmission of avian disease to swine and other susceptible animals.

LABORATORY ANIMALS

There are several reports in the literature of tuberculosis in laboratory animals, most of these in monkeys. Before the use of isoniazid, tuber-



Fig. 1. Zoo director holding chimpanzee preliminary to taking x-ray. X-ray cassette is under director's shirt.



Fig. 2. Roentgenogram of female gibbon ape. Autopsy showed acute advanced pulmonary tuberculosis.

culosis in laboratory monkeys almost always meant the loss of the entire colony. Cough is a predominant symptom in the monkey infected with tuberculosis, and, consequently, through droplet infection or dust inhalation, monkeys in near or even distant cages become infected. Spontaneous tuberculosis also occurs in guinea pigs. Transmission of the disease from an infected guinea pig to an uninfected pig in a different cage is quite rare, probably because of the absence of droplet infection. In the earlier days when sanatoria made much use of the labor of convalescent and former patients, occasional cases of tuberculosis occurred in guinea pigs which had contracted the disease from caretakers.

PETS

Many animals classified as pets can get tuberculosis from their human associates. Undoubtedly, tuberculosis in the pet monkey is one of the principal causes of illness and death. A monkey can catch tuberculosis very easily, becomes quite sick, and always dies if untreated. Thus, a positive tuberculin test in an untreated monkey means active tuberculosis. It has been shown that certain birds are susceptible to other than avian types of tuberculosis. Parrots and parakeets have been known to be infected with both human and bovine tuberculosis. If a veterinarian suspects tuberculosis in any pet, all human con-

tacts should be x-rayed. It is unwise for persons with known positive sputa to own pets.

ZOOLOGICAL ANIMALS

Many animals in the zoo can be infected with both human and bovine types of tuberculosis, but the monkey is the principal victim. Very few reports are found of the outbreak of tuberculosis in zoos, possibly because they have been unrecognized or the zoo did not want the publicity. However, there is no doubt that it is a very serious problem (figures 1 and 2).

Animals in the zoo that are most susceptible are all varieties of monkeys, the hooved animals, such as the elephants, giraffes, and camels and the rodents. The cat family appears to be strongly resistant. The following is an account of a tuberculosis epidemic occurring in the Glen Oak Park Zoo in Peoria, Illinois. Early in 1956, a Dinah monkey became ill with respiratory infection and died. An autopsy performed by the zoo veterinarian and later confirmed by the pathological laboratory at St. Francis Hospital, Peoria, revealed far advanced pulmonary tuberculosis. In the next few months, tuberculosis developed in 12 other monkeys. Ten either died or were destroyed. The entire monkey colony was tuberculin tested with 1 to 1,000 dilution of old tuberculin, which is the dose recommended in humans. All monkeys were found to be nega-

tive, including those later proved to have tuberculosis. Treatment was started on the sick monkeys using the same doses of streptomycin and isoniazid that are recommended for humans. The epidemic continued and the treatment was ineffective. Dr. Byron W. Bernard, chief veterinarian of the Zoological Society of Cincinnati, and Dr. Leon H. Schmidt, Christ Hospital, Institution of Medical Research in Cincinnati, were contacted. The Cincinnati Zoo had had a similar epidemic, and Dr. Schmidt had done considerable research in tuberculosis using monkeys as laboratory animals. On advice of these men, certain tuberculosis control measures were put into effect. The two remaining monkeys suspected of having tuberculosis are now well, and no other cases have occurred for over a year. Recommendations are as follows:

1. All zoo attendants should have pre-employment chest x-ray films taken, and all employees of the park should have their chests x-rayed annually.
2. Whenever any animal becomes ill, especially with respiratory infection, he should be removed from the general zoo quarters and placed in isolation. Here, his condition can be more easily diagnosed and treated.
3. Whenever an epidemic of tuberculosis is suspected, all monkeys should be given a tuberculin test with old tuberculin up to at least 1 to 10 dilution, which is 100 times stronger than the usual recommended dose for humans. All positive monkeys should either be destroyed

or, if they are of sufficient value, treated. Monkeys under treatment should be given INH (isoniazid), the dose being 10 mg. per pound of body weight per day, which is approximately 5 to 10 times the recommended dose for humans. As a preventive, all other monkeys in the zoo should be placed on 1/2 of this dose (5 mg. per pound of body weight) to be continued indefinitely.

CONCLUSION

The incidence of tuberculosis in animals is roughly proportionate to the incidence of the disease in man. Control of tuberculosis in animals depends upon its control in man.

Several years ago, coinciding with the use of the new antituberculosis drugs, it was freely predicted that tuberculosis will soon be eliminated. Now, it appears that this prediction may be premature. The fall in the mortality rate is leveling off, and, in many parts of this country, the incidence, as measured by newly reported cases, is actually increasing. The contagious, noncooperative patient is still with us, and, thanks to the same miracle drugs, he is much more dangerous, because incomplete or interrupted treatment has increased his activities in time and breadth. Many appeals have been made to do something about this situation with little effect. It seems that *many* fatal accidents must occur at a dangerous intersection before a traffic light is erected.

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Edward A. Meyerding, M.D.

Physician, Educator and Friend

By J. ARTHUR MYERS, M.D.

WHEN DR. HENRY MEYERDING came to the United States from Germany in the 1850's, he located in New Ulm, Minnesota. He later moved to St. Paul, where he not only practiced medicine but also was assistant health commissioner and served numerous terms on the school board. Later, as a member of the state legislature, he supported bills in the interest of public health, education, and general welfare.

Born on Christmas Day, 1879, Edward A. Meyerding had the advantages of observing his grandfather and learning about his education, public health, and practical medical work. As children, he and his brother Henry were inspired to contribute in a similar manner. Edward no sooner graduated from the Mechanic Arts High School in St. Paul in 1898 than he entered the University of Minnesota School of Medicine and graduated in 1902. For the next seven years, he was engaged in private practice. He was especially interested in eye and ear work, so, in 1909, he enrolled for graduate studies at the Manhattan Eye, Ear and Throat Hospital and at Bellevue Medical Hospital, New York City. From there he attended the Harvard Graduate School and, later, took special training in Chicago and Boston and, still later, in Paris.

Upon returning to St. Paul to engage in this specialty, his services were sought by the superintendent of schools, and he became the first school physician in that city. Among numerous other activities, he worked to provide special education for children with defective hearing, vision, and speech, as well as crippled and mentally slow individuals. Results were so remarkable that by 1914 he was made director of hygiene of the St. Paul schools.

Dr. Meyerding entered active military service in the Medical Department of the United States Army in April 1917. He was well prepared because, since

1898, he had served as a commissioned officer in various capacities in the Minnesota National Guard over a period of ten years. He was discharged in 1919 with the rank of major. On September 13, 1924, he was commissioned lieutenant colonel in the Medical Corps of the United States Army and advanced to colonel on April 17, 1935. Since July 24, 1941, he has been colonel, inactive.

When he resigned from his school position in 1924, his departmental staff had increased from 1 nurse and himself in 1909 to 18 school nurses, 1 chief nurse, 5 provisional nurses, 3 oral hygienists, 6 medical examiners, and 37 teachers of special classes.

In 1924, he was elected executive secretary of the Minnesota Public Health Association and secretary of the Minnesota State Medical Association. This was a splendid arrangement as it brought the two organizations to a better understanding of one another. During the next thirteen years, they were developed beyond any height that had ever been anticipated. By 1937, each had become large enough to require a full-time secretary. Dr. Meyerding then resigned from the State Medical Association position in order to devote his entire time to the Tuberculosis and Health Association.

In 1924, 1,708 persons were reported to have died from tuberculosis in Minnesota. This was a mortality rate of 69.5 per 100,000. The 1 state and 14 county sanatoriums were filled to capacity, and many persons were ill in their homes for lack of sanatorium beds. Dr. Meyerding was determined from the beginning to stop this terrible onslaught of a disease which was already known to be preventable. His first activity was to develop a comprehensive program. He then traveled hundreds of thousands of miles by automobile to effect good organization of the people in every nook and cranny

of the state. He repeatedly visited these organizations to make certain a uniform program was maintained in all of the counties.

Being secretary of the State Medical Association provided him an opportunity to promote tuberculosis work among the physicians throughout the state. He organized a team of medical speakers, and the local medical societies arranged programs devoted entirely to talks on tuberculosis. Dr. Meyerding usually conveyed this team in his private automobile. Some of the meetings were as far away as 300 miles, and not infrequently the trips started at noon, and, after the evening medical meeting, the return trip required the remainder of the night.

Early and accurate diagnosis was given a prominent place in the program. The specificity and accuracy of the tuberculin test were well-established. Dr. Meyerding, therefore, launched a tuberculin testing program. It was accompanied by an educational campaign to inform the citizenry of the state of the value of the test in locating persons who were harboring tuberculosis germs and the importance of periodic x-ray films of the chests of all persons who reacted to the tuberculin test.

In 1932, he arranged for tuberculin diluted and ready for administration to be delivered without cost to physicians throughout the state who desired it. This was on a demonstration basis, and it proved so effective that the State Board of Health adopted it in 1937 and has continued this fine service to the medical profession.

In the early 1920's, it had been recognized that x-ray films usually reveal evidence of evolving gross lesions in the lungs of tuberculin reactors earlier than any other phase of examination. It was also known that such lesions appear only in the lungs of persons who react to tuberculin. Therefore, x-ray film inspection should be routine procedure in all chest examinations of tuberculin reactors and periodical thereafter for those whose chests appeared clear on initial examination.

A serious problem concerning the production of satisfactory x-ray films was encountered. Many physicians throughout the state had first class x-ray equipment but were not producing satisfactory films. Dr. Meyerding made available an expert technician who spent time in their laboratories demonstrating satisfactory film technic.

In the early 1940's, when the wave of enthusiasm for mass photofluorographic surveys reached Minnesota, it had previously been established by actual studies in this state that such a program had insurmountable limitations, making it far inferior to the procedures already in vogue. However, the promoters of photofluorographic surveys created so much enthusiasm that established facts made no impression, and the surveys were introduced. Dr. Meyerding took advantage of the opportunity to cooperate purely on the basis of a device for bringing the disease to the attention of the public and better informing the people. However, tuberculin testing in the schools and elsewhere with the usual

program was continued by his association and its allies without interruption while the mass photofluorographic surveys proceeded. In only a few years, mass photofluorographic surveys ended except in a few special groups, and the regular program continued.

Dr. Meyerding has constantly emphasized the importance of transmitting information about tuberculosis to professional as well as lay citizens. For example, in 1928, he inaugurated refresher courses in tuberculosis for practicing physicians. The courses were usually held in sanatoriums. Forenoons and afternoons were devoted to examining patients and demonstrating the best diagnostic and treatment procedures of the time. The importance of isolation to prevent infection of others was especially emphasized. Immediately following luncheon and dinner, lectures were presented. Later in the evening, a lecture was usually given for the entire citizenry of the area. These courses were nearly always oversubscribed.

In 1946, he arranged a three-day course in tuberculosis for lay workers at the Continuation Center, University of Minnesota. This covered much important information about tuberculosis, which lay persons could transmit to their co-workers throughout the state. Those in attendance declared the course so valuable that it was repeated the next year with the same result. Ever since, this has been an important educational activity.

In 1934, he arranged for the State Medical Association and the Tuberculosis Association to cooperate in organizing a series of lectures on various health subjects, with special emphasis on tuberculosis, to be given by physicians well qualified in their respective fields. By 1938, four such lectures were being presented annually in 20 colleges. A tremendous amount of other educational work has been done through pamphlets, newspapers, magazines, radio, and television, as well as the monthly official publication of the organization, *Everybody's Health*.

Throughout the decades, Dr. Meyerding has made the facilities of his organization available to, and has worked in close cooperation with, about 40 other organizations.

In 1940, the State Board of Health, the State Medical Association, and the State Tuberculosis Association decided to initiate a plan whereby entire counties might be accredited on the basis of accomplishment in tuberculosis control. Standards were set up and, whenever a county qualified, an official certificate signed by officials of these organizations and the governor of the state was presented. Lincoln County, the first to qualify, received its certificate on December 11, 1941 (figure 1). In this accreditation of counties, Dr. Meyerding played a large role. The program provided educational opportunities that nothing else had done. The project continues to operate and on April 1, 1958, 67 of the 87 counties had been accredited. Most of the remainder are about to qualify.

MINNESOTA STATE
MEDICAL ASSOCIATION



MINNESOTA
DEPARTMENT OF HEALTH

This is to Certify that
Lincoln County

Has fulfilled the minimum requirements of the Minnesota Department of Health and the Minnesota State Medical Association for the control of Tuberculosis, in consideration of which this award is granted and the County designated

A TUBERCULOSIS ACCREDITED COUNTY



1941

State of Minnesota
STATE OF MINNESOTA

Secretary
MINNESOTA STATE BOARD OF HEALTH

President
MINNESOTA STATE MEDICAL ASSOCIATION

Fig. 1. First certificate issued for accomplishments in tuberculosis control.

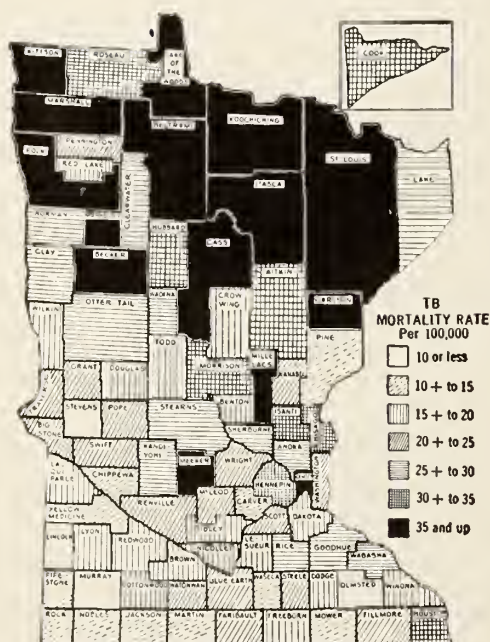


Fig. 2. Map of Minnesota showing average tuberculosis mortality rates in each county over the five-year period, 1936 to 1940.

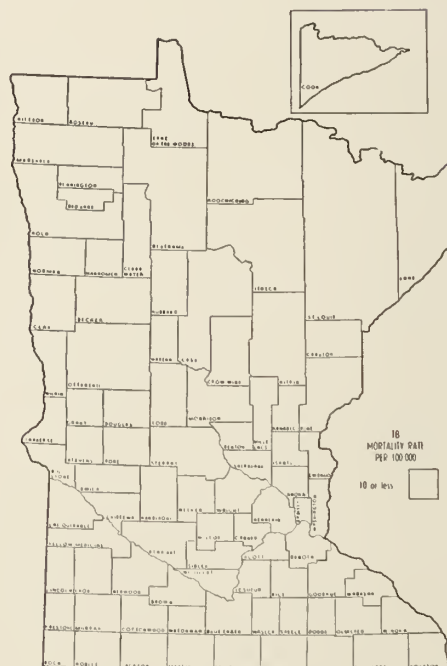


Fig. 3. Map of Minnesota showing average tuberculosis mortality rates over the five-year period, 1952 to 1956.

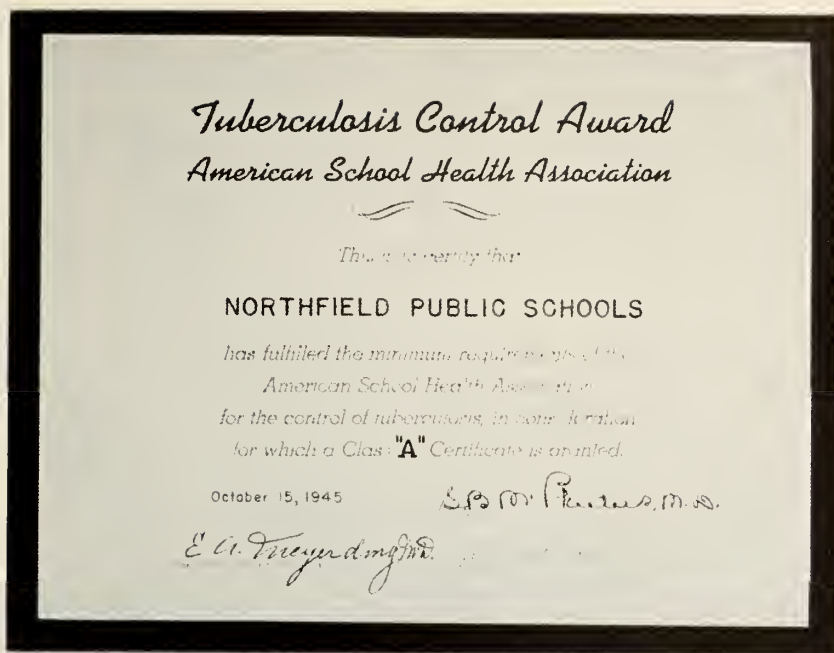


Fig. 4. First certificate issued for tuberculosis control work in progress.

In 1940, a county outline map of Minnesota was produced showing the average tuberculosis mortality in each county for the past five years. This was widely distributed throughout the state and resulted in the manifestation of a great deal of local pride among citizens. The counties with a mortality rate of 35 or more per 100,000 were indicated in black. As a result of this map, so much interest was created in the solution of the tuberculosis problem that activity in the program of eradication rapidly increased. Thereafter, Dr. Meyerding prepared a new map every two years. Comparison of the maps over the years enabled each citizen to visualize the effectiveness of work in his county as far as mortality was concerned (figures 2 and 3).

When the Committee on Tuberculosis of the American School Health Association decided to certify schools with reference to tuberculosis activities in progress, a subcommittee of physicians was appointed in each state. Minnesota was chosen to make the initial demonstration, largely because its workers had continued extensive tuberculosis work in the schools over such a long period, and Dr. Meyerding was appointed chairman of the Minnesota subcommittee. He enthusiastically proceeded with this project and with the other members of his subcommittee made the demonstration a complete success. The first official certificate was issued to the schools of Northfield on October 15, 1945 (figure 4). This project also took advantage of local pride and rapidly extended throughout the state. More than 3,000 certificates have now been issued, and many other schools are about to qualify. This project has been adopted by several states with the same good results. Wherever employed, this pro-

gram has stopped the tuberculous teacher, bus driver, or other employee from spreading tubercle bacilli to fellow workers and students. Moreover, it has resulted in more activity and a more complete program than any other procedure employed in the state.

When Dr. Harold S. Diehl, dean of medical sciences, University of Minnesota, instituted the hospital admission examination for tuberculosis at the University Hospital in 1935, Dr. Meyerding was immediately enthusiastic, and, through his organization, he began to inform physicians, hospital administrators, nurses, and all concerned throughout the state of the value of this procedure. Therefore, it was not by chance that by 1958 all but one hospital in the twin cities required admission examinations, and 80 per cent of all persons entering hospitals throughout the entire state now receive such examinations.

Dr. Meyerding is an indefatigable worker. Throughout the years, he has devoted far more time to his work than his position demanded. This accounts in part for so many outstanding achievements. He has always had more than usual ability in selecting staff workers. They are too numerous to present individually in this sketch. Suffice it to say, they have contributed mightily to the success of his program. It has been said that the name Meyerding is synonymous with Christmas Seals in Minnesota. Since becoming executive secretary of the Minnesota Tuberculosis and Health Association, he has been fully aware of the educational value of Christmas Seals. In 1922, of all states, Minnesota ranked 12th in the per capita sale of seals. With Dr. Meyerding's efforts, Minnesota had reached eighth place

in 1928, fourth in 1942, third in 1947, and second in 1948. This position has since been maintained.

The tuberculosis mortality rate decreased from 69.5 per 100,000 (1,708 deaths) in 1924 to 3.6 (117 deaths) in 1956. The number of clinical cases decreased, so several smaller sanatoriums have been closed, and the remainder are operating at about 50 per cent capacity. Tuberculosis infection has decreased among city grade school children from 47 per cent in 1926 to 4 per cent in 1954. There are now many schools in rural areas with no tuberculin reactors.

Dr. Meyerding holds membership in county, state, and national medical associations. He was an organizer of the Minnesota Trudeau Society and holds membership in the American Trudeau Society and the National Tuberculosis Association. He is a fellow of the American College of Chest Physicians. In 1938, he was president of the Mississippi Valley Conference on Tuberculosis. He has served on numerous committees of that organization and of the National Association of Tuberculosis Secretaries. In 1942, he was selected as Man of the Year by the 4-H Clubs, and, in 1956, he received the William G. Anderson award by the American Association for Health, Physical Education, and Recreation.

It has been my privilege to travel extensively with Dr. Meyerding by automobile in the state and by rail and airplane to many of the large centers

of the country attending conventions. We have conferred hundreds of times concerning methods of attacking and destroying the tubercle bacillus.

Throughout this intimate association of more than a third of a century, he has constantly proved his integrity, sincerity, and ability. He always manifested a strong courage of his convictions. Any individual or group who threatened to harm his well-thought-out program or the cause for which he worked had to be prepared to do battle. His fight against tuberculosis took precedence over everything else in his life. He placed his organization behind every worthwhile tuberculosis control activity and has been responsible for the completion of many projects which otherwise would have been left unfinished.

To Ed Meyerding belongs much credit for outstanding achievement in tuberculosis control. Much that is being accomplished today would not be possible without the years of preparatory work which he directed. When he retired on April 1, 1958, one of the most active and productive careers in the fight to exterminate tuberculosis in this country's history was closed. For well-nigh a third of a century, he was one of America's most powerful forces against this disease. Fortunately, fires he kindled in many others are still burning brightly. From them others will be lighted, and, thus, the goal so clearly visualized by Dr. Meyerding may be realized by other generations.

PLANS ARE UNDER WAY for the Special Issue which will be published in June in honor of the eleventh World Health Organization Assembly meeting to be held May 26 through June 14 in Minneapolis. Serving as a channel of communication on an international basis, the June issue of *THE JOURNAL-LANCET* will afford an unusual opportunity to become acquainted with the health problems of many nations.

The *JOURNAL-LANCET* is happy to be an avenue of information concerning the outstanding work of WHO and the important personalities responsible for this movement.

Radiation Hazards

THE ARTICLE in this issue entitled "Ionizing Radiation in Medicine—A Useful Tool and a Hazard," by Drs. Marvin, Loken, and Mosser is very timely. This editorial is written to call attention to their article and to emphasize some aspects of safe fluoroscopic and radiographic examinations.

Among the group of doctors with whom I am personally acquainted in this area—Minnesota, North Dakota, and South Dakota—2 have died of leukemia within the last five years, undoubtedly due to too much radiation. One physician died of metastases from a carcinoma of the finger secondary to radiation damage of the hand because he did not wear lead rubber gloves during fluoroscopy.

Many patients in the states served by this magazine have had to undergo plastic surgery for radiation damage to the back caused by too prolonged fluoroscopic examinations, inadequate filtration in the fluoroscopic tube, or both. It, therefore, behooves us as doctors to protect ourselves, aides, and patients from too much radiation.

Film monitoring badges should be worn by all personnel in all x-ray departments.

We must not order or perform unnecessary x-ray examinations, but all indicated radiographic examinations, I believe, can be performed safely without danger to the doctor, technician, or patient if the proper safety precautions are observed.

We must do everything possible to minimize the total exposure to all concerned. The equipment must be properly installed with proper lead protection in the walls and an adequate lead protected booth for the operator. All equipment should be checked for radiation hazards by a competent person at periodic intervals. All radiographic diagnostic units should contain at least 2 mm. aluminum filter. The smallest possible cones should be used.

Fluoroscopic units should contain at least 2½ mm. aluminum filter. Older fluoroscopic units with short tube tabletop distance should be discarded or rebuilt. The fluoroscopist must take sufficient time to become adequately accommodated. He should use as small a field as possible at all times and should not use over 3 to 4 milliamperes of current. The fluoroscopist must wear rubber gloves and an apron. The gloves and apron should be checked periodically for cracks and leaks. Lead gloves and aprons provide only partial protection. The fluoroscopist must, therefore, keep his lead-gloved hands out of the x-ray beam as much as possible.

A fracture should never be reduced under the

fluoroscope. The patient is exposed to much less radiation from multiple films, and the doctor who is reducing the fracture is in no danger. All fluoroscopic units should be calibrated to make sure that the output at the tabletop is not over 10 r per minute. All fluoroscopes should be equipped with a timer that will shut off the equipment automatically at the end of three to five minutes.

Films should be substituted for a fluoroscopic examination whenever possible. Multiple films probably give more information than a fluoroscopic examination. When necessary, a very short fluoroscopic examination can be done, supplemented with films, so total exposure to the patient is kept at a minimum.

Fluoroscopic examinations in children should be performed only when a very good indication exists and then should be completed in as short a time as possible. Routine fluoroscopic examinations of children's chests should be abandoned. It has been reported that a five-minute fluoroscopic examination performed on a child doubles the chance that leukemia will develop during his lifetime.

In infants and children with a condition such as Perthes' disease or congenital dislocation of the hip that will require numerous x-ray examinations, the gonads should be covered with lead on the follow-up radiographic studies.

X-ray examinations of the abdomen of pregnant women should not be done, except under extremely urgent circumstances. X-ray pelvimetry should be used only when it cannot be determined by clinical means whether the pelvis is adequate or when some abnormality is suspected. A study in England has shown that the incidence of leukemia in children is doubled by an x-ray pelvimetry examination before delivery.

The advisability of continuing 70 mm. photofluorographic chest survey programs has been discussed in many lay and medical articles in the past few months. Recently, James E. Perkins, M.D., managing director of the National Tuberculosis Association, published a paper on this subject. He concluded that if a person had a 70 mm. photofluorographic chest examination every year from the age of 15 to 30, he would have received a total of less than 1 per cent of the amount of radiation exposure considered safe.

I, therefore, believe it advisable and safe to continue chest photofluorographic surveys in all areas in which the yield is significant.

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The Last Tubercle Bacillus

THIS ISSUE OF THE JOURNAL-LANCET contains a highly significant paper entitled "The Tuberculin Test" by Dr. Paul S. Dodd and another on "Tuberculosis from Man to Animals" by Dr. George D. Morse. They are important to all who visualize the eradication of tuberculosis and to those who should acquire such a vision. The authors make it clear that the attack must be made on all three pathogenic forms of tubercle bacilli, inasmuch as each type produces progressive disease in more than one species. For example, the human type, in addition to man, causes clinical tuberculosis in such animals as primates, swine, dogs, and parrots, which may disseminate their bacilli not only to other animals but also to people. Since the human type produces sensitivity of tissues in cattle, it is obvious that this form must be sought in animals as well as in people.

Although among the 95 million cattle of this country, veterinarians and their allies have reduced the incidence of those harboring tubercle bacilli to 0.156 per cent, cattle are still in considerable danger of becoming infected from people. Those cattle which are infected with the human type of bacilli may react to tuberculin and, therefore, must be sacrificed even though their lesions do not become clinical.

The problem will never be solved if tuberculosis work is limited to human beings, as they may be infected with the bovine type of tubercle bacilli acquired not only from cattle but also from dogs, cats, swine, parrots, and other animals.

While there are only slightly more than two dozen known cases of authentic clinical tuberculosis caused by the avian type of tubercle bacillus in man, this subject has never been thoroughly investigated. Therefore, it is possible that the problem is more serious than has been suspected. The very fact that definite cases have occurred is sufficient reason to support the veterinarian's campaign to eradicate the avian type of tubercle bacillus. It produces clinical disease in fowl and other species, such as swine, and, thus, is a serious economic problem.

This emphasizes the necessity for close cooperation between veterinarians, physicians in human medicine, and every interested group in making the all-out eradication attack on the tubercle bacillus. Failure to do this in the past has been costly in retarding progress.

There are so many diseases transmissible from animals to people and vice versa that every board of health and tuberculosis association, state and local, should have one or more veterinary members.

Veterinarians have led the way and are so far ahead of physicians in human medicine in tuberculosis eradication that their counsel should be sought continuously. The example set in Illinois is one that should be emulated and employed everywhere.

Dr. Dodd has long been an active member of the Illinois Tuberculosis Association and has served on important committees. Now he is president of that organization. He tells how veterinarians went from farm to farm through rain, snow, and mud as well as during clement weather, so that every animal in a township, county, and state would be tested with tuberculin. It made no difference whether there was 1 or 50 animals on a farm; all were tested. Moreover, periodic testing of cattle has continued among the 95 million animals in this country despite the fact that, in some places, such as the upper midwest states, 5,000 or more tests must be administered to find one reactor.

When this thoroughly organized program was introduced on a nation-wide basis in 1917 and prosecuted to the nth degree, no such consideration was given to the tuberculosis problem among people. Only recently have physicians, nurses, and their allies organized to visit each home in a township, a county, or a state to find every person harboring tubercle bacilli.

In 1917, physicians in human medicine had the same tools as veterinarians, but they were hampered by theories, personal opinions, speculation, and the like. Forty years passed (1917-1957) with the veterinarian unceasingly promoting his program, while the physician in human medicine continued to labor over such questions as what does the tuberculin reaction mean? which kind of tuberculin and which method of administration should be employed? The threadbare statement "you can slaughter the cattle, but you can't slaughter people" was parroted. The result is that even twenty years of the veterinarian's program brought such achievement as to be designated "man's greatest victory over tuberculosis," and the next twenty years were no less spectacular. In 1957, only 0.156 per cent of the nation's 95 million cattle were harboring tubercle bacilli, and apparently some of them were infected by their human associates. Trailing in the far distance is the physician in human medicine with a record of approximately 33 per cent of the 173 million people harboring tubercle bacilli, among whom thousands are breaking down with clinical disease annually and often disseminating tubercle bacilli to others.

Only in recent years have a few persons been able to obtain adequate support to certify schools with reference to tuberculosis work in progress and, thus, make them safe from the standpoint of dissemination of tubercle bacilli. Only a few have won support for offering the tuberculin test to people of all ages on county-wide or municipal-wide bases and, in this way, locate all the tubercle bacilli residing in the area and act accordingly.

Veterinarians have shown that there is no short cut to eradication of tuberculosis. There is no effective immunizing agent. There is no drug yet avail-

able to destroy bacilli in the animal or human tissues such as we have for some other micro-organisms.

If a thoroughly germicidal drug becomes available, in all probability it will be of no help in destroying all tubercle bacilli in the bodies of persons now harboring them. They are secure in necrotic avascular areas, so that cure of the disease in the sense of killing all tubercle bacilli in the bodies of such persons will remain a forlorn hope.

To catch up with the veterinarian will require longer than forty years, because the life span of people is much greater than that of domestic animals and because every infected person must be kept under close surveillance throughout the re-

mainder of his life span. This means that if we allow infants to become infected, the period of surveillance must be continued for seventy or more years on the average.

There is nothing to be gained but much to be lost in continued procrastination. The only method now available that offers the slightest hope of ultimate eradication of tuberculosis consists of locating all tubercle bacilli in both people and animals and outwitting them until the last one has vanished. The goal is far off but is attainable by the methods described by Drs. Dodd and Morse.

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Clinical Gastroenterology, by EDDY D. PALMER, M. D., F.A.C.P., 1957. New York: Paul B. Hoeber, Inc., 630 pages, 216 illustrations. \$18.50.

When anyone writes a book of this size, the interested reader usually has three impressions: (1) how much the author knows about the subject; (2) how much the author does not know about the subject, and (3) how much remains to be learned about it.

The title of this book might well have been *Clinical Gastroenterology Viewed From the Standpoint of an Internist*. Certainly there are phases of gastroenterology which could not be well discussed by anyone other than a surgeon who affects a special interest in the alimentary canal and its appendages.

One cannot read this book without appreciating that its author is a good observer and an astute clinician. Moreover, it is a very readable book. The active cooperation of an experienced surgeon or surgeons in dealing with some of the disorders treated in the text would undoubtedly have enhanced the value of the monograph considerably.

How myopic some of the views of the author are is readily detected in the section on gastric cancer. Concerning surgical management, he says: "Surgical help is required for the relief of pyloric obstruction, for control of the unusual cases of severe hemorrhage, and for whatever help is possible in cases of acute perforation." Under the caption of *Philosophy of the Gastric Cancer Problem as it Stands Today*, the writer says: "It seems clear that we should give up current measures directed at cure as a bad job now, without waiting for a more effective



replacement. A degree of emotional and physical comfort is all that can be promised the patient at the moment. It at least represents a retreat from the current blind track which is necessary before the right track can be found. A doctor should consider well his responsibility to avoid being frightened into unleashing the whole pack of therapeutic hounds against the cancer as a way out for himself but not necessarily the patient."

However much we lament the circumstance that the surgical management of gastric cancer is not what it should be, there is after all a definite accomplishment. When the writer suggests that 10 to 15 per cent of untreated patients with gastric cancer survive five years or more beyond the period at which symptoms first appeared, he obviously is recording an experience unfamiliar to most of us who have a real interest in this problem. A 10 to 15 per cent five-year survival is the meager accomplishment, which surgical clinics attacking the problem vigorously are reporting. And however small that accomplishment is, it certainly far surpasses the survival of patients left to their own resources. In this clinic, no untreated patients with gastric cancer have

survived five years after the appearance of symptoms. This is dangerous philosophy, which the author of this book is preaching—a circumstance too which indicates how much he is in need of active surgical collaboration in a monographic assault upon the problems of clinical gastroenterology.

It is an easy matter to detect a few weaknesses in a monograph covering so wide a range. It is in many respects a very informative text, interestingly written, which will have a wide appeal especially among those who do not expect too much of surgery or of surgeons.

OWEN H. WANGENSTEEN, M.D.

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Fundamentals of Clinical Neurophysiology, by PAUL O. CHATFIELD, M.D., 1957. Springfield, Illinois: Charles C Thomas, 392 pages. \$8.50.

The author states in the preface that the book is meant to present a global view of the subject for the use of nonspecialists in the field of neurophysiology. This view, he says, will be influenced by the author's varying interests in the different subjects. This is, of course, true of any book written by only one author.

In this case, however, we find a fairly well-balanced emphasis on all the important parts of neurophysiology. The fundamental principles of the subject are very clearly stated in a didactic and stimulating fashion.

The problems of nerve conduction, propagation of impulse, and synaptic transmission are discussed at the beginning. This is followed by a review of the physiology of receptor organs in general and in particular. One chapter deals with the physiology of

skeletal muscle, briefly mentioning the technic of electromyography and discussing in a synthetic and clear way the probable functions of the small fiber system of the ventral roots.

The rest of the book is devoted to the central nervous system, starting with the spinal reflexes, postural coordination, and going on to discuss the physiology of the vestibular apparatus, basal ganglia, and cerebellum and cerebral cortex, including thalamocortical relationships. Here, the specific and diffuse projection systems are mentioned, and the different steps that lead to our actual knowledge of these systems are summarized. The final chapter is a brief review of the facts concerning the central representation of the autonomous nervous system and the neurophysiology of emotions.

The chapter on the nervous control of breathing is particularly important. This part needs a special mention, not only because of the clinical importance of the matter in any specialty of medicine or physiology, but also because of the author's vast knowledge of the subject. Dr. Chatfield has published several papers on his experimental findings regarding this problem, and this chapter is a clear and intelligent synthesis of the work of many outstanding workers.

References are listed separately at the end of each chapter, and the index of authors is long and quite complete, considering the size of this volume.

One criticism that can be made is about the fact that proportionally much greater emphasis is placed on the first part of the book dealing with peripheral nerve and general neuro- and electrophysiologic problems than on the physiology of the central nervous system, especially in regard to the cortex, thalamus, and basal ganglia. Interesting new findings like those referring to the role of dendritic potentials in the spontaneous cortical activity are barely mentioned. Many interesting possibilities about the role of the diffuse projection system of the thalamus are not extensively treated.

This, however, is probably in keeping with the general scope of the book. We can definitely say that the goal of producing a short, clear, and very well presented picture of the physiology of the nervous system for the purpose of teaching students and newcomers to the field was amply accomplished. The author himself tells us in the preface that the problems for which answers are not yet clear are deliberately omitted. It is only because we wanted to read more about them in the same clear and simple style in which Dr. Chatfield writes throughout his book, that we found ourselves missing a more complete discussion of certain central nervous system problems.

This book is definitely worthwhile for teachers and those interested in learning about the nervous system.

FERNANDO TORRES, M.D.

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The Early Diagnosis and Treatment of Acoustic Nerve Tumors, by J. LAWRENCE POOL, M.D., and ARTHUR A. PAVA, M.D., 1957. Springfield, Illinois: Charles C Thomas, 161 pages. \$5.50.

This monograph represents a review of the acoustic nerve tumors in which the authors utilize 6 previously reported series of cases in addition to a series of 122 cases of acoustic nerve tumors operated upon at the Neurological Institute of New York during the years 1944 to 1955.

History, terminology, histogenesis, pathology, and incidence are all dealt with categorically, albeit, in some cases, briefly. Symptoms and signs are chronologically reviewed with emphasis upon the preponderance of primary complaints and findings referable to eighth nerve involvement. The incidence and chronologic order of appearance of headaches, cerebellar involvement, cranial nerve involvement, increased intracranial pressure, and terminal involvement are thoroughly discussed and a complete description of the variation of signs and symptoms attendant upon these conditions is included. Diagnostic procedures, such as skull roentgenograms, air en-

cephalography, arteriography, electroencephalography, examination of the cerebrospinal fluid, and audiometric and vestibular tests are described, and the authors comment on their opinion of the value of each procedure. There is a section containing the histories of 6 atypical cases in the author's series and another concerning differential diagnosis.

However, the most interesting and valuable part of the monograph is that devoted to discussion of the surgical approach to the neoplasm. The authors present a rather convincing case for attempts at total removal whenever possible. The entire surgical technic is elaborated upon and is accompanied by a number of illustrations. Moreover, several subtle refinements of surgical technic, such as partial resection of the cerebellum and sparing of the facial nerve, are described.

The authors conclude with sections on postoperative management; morbidity, including immediate postoperative complications and later sequelae, a discussion of the technic of facial nerve anastomosis; and an analysis of the mortalities in their series.

DAVID F. MENDELSON, M.D.

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It Pays to Be Healthy, by ROBERT COLLIER PAGE, M.D., 1957. New York: Prentice-Hall, Inc., 285 pages. \$4.95

It pays to read "It Pays to Be Healthy." This unique book describes in an excellent manner modern medicine in modern industry. By paying attention to the health of the individual, benefits come to both employee and employer. Dr. Page supports his statements by interesting case reports which add a great deal to the value of the book.

The last chapter on retirement is especially good and is very helpful in preparing for that day when the tempo of life must change.

This book is to be recommended with enthusiasm to physicians, patients, and all people interested in the preservation of health.

ARNOLD S. ANDERSON, M.D.

Comments concerning this Section, criticisms, or suggestions for papers will be most welcome. Physicians are cordially invited to submit articles pertaining to pain for consideration. All inquiries and manuscripts should be sent to Dr. John S. Lundy, 102 Second Avenue Southwest, Rochester, Minnesota, or to the Editorial Department, THE JOURNAL-LANCET, 84 South Tenth Street, Minneapolis, Minnesota.

Pelvic Pain in Women—a Universal Problem

G. F. DOUGLAS, M.D., G. F. DOUGLAS, JR., M.D.,
G. C. DOUGLAS, M.D., W. W. DOUGLAS, M.D., and
SARAH F. DOUGLAS, M.S., M.T.

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THIS title indicates that, not only the gynecologist and obstetrician, but the internist, urologist, proctologist, and general surgeon are concerned with the problem of pelvic pain in women.

Nerves that supply the ovary are derived from the renal and aortic plexuses and accompany the ovarian vessels in the tissue of the suspensory ligament of the ovary. Embryologically, they arise high in the abdomen and receive their nerve supply from a source other than the pelvic viscera. Pain of ovarian origin is often due to the stretching of the covering of the ovary, which disturbs circulation. As a rule, tumors of the ovary, either benign or malignant, cause very little pain in their incipency.

Pains originating in the ovary, such as *mittelschmerz*, should be diagnosed, particularly if this pain comes about the middle of the cycle or the ovulation period. The gynecologist should be a skilled diagnostician, for his diagnostic acumen will enable him to treat the pain wisely rather than to do radical surgery early.

Tumors of uterine origin are, as a rule, asymptomatic. When symptoms do arise, they are probably due to pressure on and adherence to surrounding structures or from secondary changes in the tumor itself.

Carcinoma of the body of the uterus or of the cervix rarely causes pain until lesions have metastasized or the contiguous nerve structures

have been involved. One of the frequent causes of abdominal pain may be from a postabortal process which could involve the uterus primarily. Not the rule, but, in some instances, considerable pain follows procidentia, such as discomfort in the lower pelvis. Associated with this there may be an enteroptosis or descent of the pelvic viscera which causes pulling on the intra-abdominal contents with some discomfort.

Painful menstruation, or dysmenorrhea, is a symptom rather than a true pathologic finding or cause. The cause of this abnormal manifestation of pain should be ferreted out very carefully by a study of the different systems—neurologic, gastrointestinal, and urologic—and other somatic factors. After all of the factors have been ruled out, and, if the pain is neurogenic in origin, an excision of the superior hypogastric plexus of nerves, such as done in Cotte's operation, often gives complete relief. But, if there are causes outside the uterine cavity or other pathology, we need not expect this operation to produce a cure. The so-called membranous type of dysmenorrhea is usually characterized by severe pain and the passage of shreds in the menstrual blood which, at times, amount to a complete cast of the uterine body.

One of the severe types of pain in the pelvis is that of ruptured ectopic pregnancy. Of course, this condition occurs most frequently in the fallopian tubes and can rarely be diagnosed by the catastrophic pain at the time that rupture takes place. One of our more simple diagnostic procedures is cul-de-sac tapping by which the blood obtained does not clot. This finding, as a rule,

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leaves very little doubt concerning the diagnosis if other symptoms have preceded it, such as pain, shock, skipping a period for a short time, and so forth. When considerable loss of blood accompanies this disturbance, it is well to obtain a determination of the prothombin time which, if excessively prolonged, may be combated by the intravenous administration of vitamin K. Transfusions of whole blood may be necessary. The treatment of choice is immediate surgery.

A condition that should not be overlooked in pain of the pelvis, which might be more of a chronic nature, is the varicocele or the varicosities of the veins about the broad ligaments. This occurs much more frequently than is correctly diagnosed. When varicosities are present, a thrombophlebitis often originates in the pelvis and then extends into the legs. The operation for varicocele provides a simpler and safer method of relieving the pelvic pain than many other accepted operative measures. So, if a correct diagnosis can be made early, the patient will probably be relieved of pain without requiring much more hazardous surgery.

Pelvic pain is frequently associated with pelvic lesions in which an ovarian cyst is found, sudden hemorrhage accompanying rupture of ectopic pregnancy, rupture of a corpus luteum cyst in which bleeding follows, or pelvic inflammation. In a study at the Mayo Clinic of pelvic pain as related to endometriosis, it was found that 54 per cent of the patients with pelvic endometriosis had no pain. Some of the rarer findings in the pelvis should not be overlooked. You may have actinomycosis along with granulomatous disease of the pelvis. I would pause for a minute to call attention to the occasional ease of ectopia of the ureters distal to the internal urethral sphincter at which there is continuous leakage. It is congenital in origin and is often overlooked until a study is done.

Abnormal vaginal bleeding not associated with pregnancy should not be disregarded. Vaginal examination should be done when the patient presents herself to the physician with a history of bleeding, rather than later when the period has ceased. Oftentimes the bleeding is due to a carcinoma of the cervix or of the fundus. If diagnosed at once, the patient's life can probably be saved, whereas, if deferred, she has no chance of recovery.

Different individuals have very different degrees of threshold levels of discomfort. Severe pain to one individual might be discomfort to another, so that, in evaluating the degree of

severity, we must have some idea of the pain threshold of the individual.

Chronic residual pelvic inflammation of the reproductive structures may provoke pain over the years. The differentiation of acute salpingitis and appendicitis is not always easy, and it is generally believed that chronic appendicitis does not occur nearly as frequently as was formerly thought. In many instances, pathology other than the appendix is involved. For example, pain in the urinary tract might be diagnosed appendicitis, whereas it might be pyelitis, ureteritis, stricture of the ureter, or, in some instances, a stone in the urinary tract. Finally, a pyogenic type of pelvic inflammation usually involves the serosa and wall of the fallopian tube, less often the mucosal lining.

In our endeavor to differentiate or arrive at a proper etiology of the pain in the fallopian tubes, we should not overlook tuberculosis, for this condition occurs more often than we realize. The per cent of tubercular salpingitis, as a causative factor in sterility studies, differs in various parts of the country. Some say it occurs as often as 5 per cent. These statistics are Dr. Albert Sharman's of Glasgow, Scotland. However, in many places, it is no more frequent than $\frac{1}{2}$ to 1 per cent or $1\frac{1}{2}$ per cent. In other countries, the statistics run as high as 15 to 20 per cent. However, with the eradication of tuberculosis of the chest and other portions of the body, one would naturally expect tubercular salpingitis to decrease.

In making a differential diagnosis of a ruptured ectopic pregnancy with other causes, in probably 80 to 90 per cent of the cases, the patient has missed her menstrual period. This may have been for two weeks, or six to eight weeks, but a good or satisfactory history of menstruation and other factors often aid in a correct diagnosis.

As stated before, an ovarian neoplasm does not always produce early pain, but, if it is a solid tumor, it should be regarded as possibly malignant and warrants an early operation.

We should not overlook the so-called somatic abdominal pelvic pain. A number of people come under this category, but, certainly, they should not be classified as such until all known pathology that may be present has been ruled out.

Certain individuals with pelvic pain can be relieved by either sympathectomy, as previously stated, or intraspinal alcohol injections. The latter is given more commonly with the intractable pain associated with carcinoma of the

uterus, particularly of the cervix. The pelvic sympathectomy or the removal of a part of the sympathetic nerve plexus or presacral neurectomy, in which the presacral or the superior hypogastric plexus is removed, is not a serious operation. However, proper diagnosis should be made before operating or the results will be disappointing.

In a study of 5,539 patients, Guerriero and Stuart found the chief complaint of pain was in the region of the pelvis. These men stated that there were 1,371 cases either of gynecic origin or simulating such pain. Five hundred and seventy one, or 41.6 per cent, of these women actually had pelvic pain of other than gynecic origin, and 800, or 58.4 per cent, had gynecic states to explain the origin of their pain. They stated that only 10.6 per cent of their cases required major surgery for relief of their pain.

The management of severe dysmenorrhea and pelvic pain is a problem now as it was in 1852 when Marion Sims stated "of all the newly found drugs, not any is of much value to the woman with severe pain except laudanum." In other words, he was stating that a drug to relieve women of pain was considered, rather than a diagnosis of its cause.

As late as 1921, Leriche made a complete study of the pelvic sympathetic system in its relation to pelvic pain, and he developed the procedure of periarterial sympathectomy of the internal iliac arteries. Four years later, in 1925, Cotte found that the same results could be obtained by resection of the superior hypogastric plexus. Cotte, as mentioned before, called the superior hypogastric plexus the presacral nerve.

Cervicitis, the pain of labor in its first stage, and retroumbilical (not umbilical) pain of appendicitis are visceral pains, deep seated, ill localized, and with no somatic component.

The rupture of a corpus luteum may present a clinical picture essentially similar to that of a ruptured follicle except that the time of onset of menstruation is different. Many women with bilateral pelvic pain do not have pelvic inflammatory disease. Pelvic cellulitis is seen most frequently in puerperal patients, and it often occurs in nonpregnant patients after uterine or cervical instrumentation.

Rupture of a tubo-ovarian abscess is a very serious condition. Often, the patient becomes profoundly ill in a very short time before the peritonitis develops that will cause demise. Laparotomy is done with the principal aim of establishing intraperitoneal drainage, and the intes-

tines should not be greatly disturbed. Administration of blood, fluids, antibiotics, and so forth should be relied on largely for the treatment.

Severe abdominal pain may arise from neoplasms which have undergone torsion, with hemorrhage into the tumor which might rupture. Late pregnancy often results in placental infarction that can simulate a placental separation. Pains may be of intragenital origin, in which the pelvic lesions responsible are recognizable, or they may be extragenital, in which normal pelvic organs are present. The cervix is rather insensitive to pain, and tenacular forceps can frequently be placed on it without too great a discomfort.

In the later years of life, many women suffer a bearing down sensation or a "weight in the pelvis," which is due to a cystocele, rectocele, or uterine prolapse. In cases of secondary pain or dysmenorrhea, endometriosis should not be overlooked. Endometriosis is one of the most incapacitating of the chronic pelvic pains. Some of the other causes of pains that may be associated with gynecologic pathology are the extragenital type other than pelvic varices, relaxation or strain over the sacroiliac joints, diverticulosis found in the bowel, backache often due to constipation, and pain caused by orthopedic problems.

Pelvic pain is a prominent symptom in many pelvic lesions, and its interpretation requires careful investigation. But, we should make careful study of all the systems relating to the pelvis—the gastrointestinal, the genital, urinary, neurologic, and psychosomatic.

It has been stated that pain is now accepted as a sixth and separate sense, quite apart from the so-called primary senses of sight, hearing, taste, smell, and touch. Visceral peritoneum is often and is usually insensitive to local stimuli, such as pricking, cutting, or pinching. However, any pull on a mesentery or attaching a viscus to the abdominal wall will cause pain.

The nerve supply to the pelvic organs include the bladder, perineum, vulva, vagina, and anal regions included in the types: (a) somatic or cerebrospinal, (b) sympathetic, and (c) parasympathetic. Thus, excision of the superior hypogastric ganglia or presacral nerves may relieve primary dysmenorrhea.

Pain from the pelvic viscera reaches the consciousness of the individual through somatic afferent nerve fibers called the viscerosensory nerves, which pass upward from the pelvic viscera in the sympathetic chains. Some theories set forth concerning the etiology of pelvic pain

have been mentioned, such as chronic metritis, chronic salpingitis, chronic appendicitis, adhesions, congestion, psychoneurosis, and ovarian dysfunction. Under the syndrome of ovarian dysfunction, we have pelvic pain, menorrhagia, metrorrhagia, cystic ovaries, tender ovaries, tender uterus, dyspareunia, infertility, and nervous exhaustion.

Considerable discomfort or pain may arise from disturbance of the functions of the bones, joints, muscles, ligaments, and fasciae of the trunk pelvis and lower extremities.

A clinical method of measuring the motion of intrapelvic pain is presented by Pitkin.

Pelvic myalgia is a term coined to describe a painful spasm of the piriformis group of muscles. The muscles that are affected either singularly or in groups are: (1) piriformis, (2) inferior gemellus, (3) superior gemellus, (4) obturator internus, (5) gluteus medius, (6) levator ani, and (7) coccygeus. Myalgia is one of those conditions causing pain, not usually found in the pelvis, and the pain probably would not be exaggerated by careful digital examination. Powell states that about 10 per cent of these cases are made worse by massaging the pelvis. Pelvic myalgia is not a clinical entity, but is a complication of posterior urethritis, an anal or rectal pathologic condition, or an orthopedic defect.

In 1921, Leriche introduced periaarterial sympathectomy of the internal iliac (hypogastric) artery for the relief of pelvic pain and obtained good results. As previously stated, in 1924, Cotte found that by sectioning the superior hypogastric plexus (presacral nerve of Latarjet) equally good results were obtained as those obtained by Leriche. In 1913, Latarjet described and named the presacral nerve as a distinct nerve.

It is unfortunate that so many patients, and far too many doctors, are imbued with the idea that the only solution to many of the ailments of women, especially chronic pain and discomfort in the abdominopelvic region, is surgery. We might add that women who complain of chronic lower abdominal pain are "pushed around" medically and surgically speaking much more than any other group of patients. Pelvic treatment should be largely conservative unless there is a definite indication for the removal of the organs, such as uteri, ovaries, tubes, and so forth.

Somatic innervation applies both to the sensory and the motor nerve supply to the frame of the body. As is known, a spinal nerve arises from a segment of the spinal cord and is composed of an anterior (motor) root and posterior (sensory)

root. In the posterior sensory root is found the spinal ganglion in which are located the nutrient cells of the sensory apparatus. This ganglion will be mentioned in connection with the so-called sympathetic sensory nerves. After a short course as a single nerve trunk, each spinal nerve divides into anterior and posterior branches, which contain both sensory and motor components. Thirty-one such spinal nerves — 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 1 coccygeal — are present on each side of the body.

Visceral innervation is effected by the autonomic or involuntary nervous system. Below the sacral promontory, the superior hypogastric plexus becomes the middle hypogastric plexus, and the latter divides at the level of the first sacral vertebra to form the bilateral inferior hypogastric plexuses.

One of the most trying problems in gynecology is presented by the patient who relates a history of pain for which the physician can find no satisfactory organic cause. Minor deviations from absolute normal, such as freely movable retrodisplacement of the uterus, cervical hypertrophy, or a slightly enlarged ovary may be the cause of the difficulty.

As you will remember, Menninger has pointed out that surgery is often sought by patients who fear something more than they fear surgery. Many physical symptoms find their underlying cause in the operation of emotional disturbances upon the autonomic nervous system. Emotional factors may play the same role in the production of so-called tension or migrainous headaches. Wolff has shown that migraine headaches are vascular in origin and develop in 3 distinct phases:

1. The vasoconstriction phase, which is brief and does not cause pain.
2. The vasodilation phase, which is the immediate cause of pain in that pain sensation structures surrounding certain vessels are stretched or pulled upon.
3. The edema phase, which follows the vasodilation phase and lasts a considerable length of time.

Pain is generally described as organic or functional but might better be distinguished as somatogenic and psychogenic. In the development of a psychosomatic disorder, there are 3 requisites. (1) a psychoneurotic predisposition, (2) an exciting emotional conflict, and (3) restriction of outward expression of the conflict.

It is estimated that pelvic pain accounts for at least 35 per cent of the admissions to a

gynecologic ward. The urologic system should never be overlooked in differentiating obscure pains in the pelvis or the lower abdomen, especially if they are of a chronic nature.

Mengert has given a very workable classification of pain, the general headings of which are:

1. Pain of genital origin, such as gonorrhea, pelvic inflammatory disease, pelvic cellulitis, and hemorrhage.

2. Uterine prolapse, adhesions, and twisted pedicle of ovarian cyst.

3. Periodic distention of endometrial implant.

4. Tumor incarcerated in the pelvis.

5. Rupture of uterus, tube, or bladder.

6. Pelvic neurosis.

7. Pain originating in other pelvic structures, such as: (a) the sacroiliac, (b) urinary tract, and (c) intestinal tract.

A retrodisplaced uterus is not considered a cause of pelvic pain nearly as frequently as it formerly was. There is little clinical or pathologic similarity between adenomyosis and the large "chocolate cyst" of the ovary.

Some of the gynecologic diseases causing pelvic pain might be listed as: (1) cervicitis and parametritis, (2) uterine enlargements, (3) pelvic endometriosis, (4) malpositions of the uterus, (5) pelvic congestion, and (6) adnexa disease. Cervicitis is manifested by erosion, hypertrophy, eversion, cystic change, and enlargement. Enlargement of the uterus causes backache and abdominal pain because of pelvic congestion from the stretching of supportive ligaments.

Endometriosis of the pelvic viscera rates high in the classification of gynecologic causes of pelvic pain. Gynecologists are becoming more aware of this condition and are diagnosing it much more frequently than in former years. The presence of tender, cul-de-sac nodules, a retroverted tender uterus and fixed adnexa, lower abdominal pain, dysmenorrhea, and dyspareunia offer strong evidence that endometriosis is present. Howard Taylor describes a condition that he names the "congestion fibrosis" syndrome, in which pain is caused by vascular and tissue congestion in the pelvic structure.

In the treatment of pelvic pain, first, the correct diagnosis should be made if possible, and, second, each point of pathology should be recognized and treated accordingly. In endometriosis, which causes so much pain, Greenhill and others have suggested that testosterone be given in doses of 25 mg. three times weekly for four weeks. After a rest period of three to four weeks, this therapy is repeated.

In summary, let us say that every case of pelvic pain should receive a careful evaluation, which may require two or more office examinations and that no rule should be adhered to absolutely. Each patient must be treated individually.

CONCLUSIONS

1. Pain brings women to their physicians more frequently than any other cause. Pelvic pain is responsible for the greater per cent of these visits.

2. Ovulation may be a cause of pelvic pain more often than is diagnosed.

3. Carcinoma of the uterus or the body of the cervix is usually asymptomatic.

4. Ruptured ectopic pregnancy is the cause of severe pain associated with shock.

5. Thrombophlebitis may cause pain in the pelvis or broad ligaments and should not be overlooked.

6. Tuberculosis of the tubes should be considered in making a differential diagnosis of pelvic pathology.

7. The sympathetic nervous system often plays a great part in the pelvic pain of women.

8. Nerves supplying the pelvis and urinary region include 3 types: somatic or cerebrospinal, sympathetic, and parasympathetic.

9. Myalgia is a condition not usually found in the pelvis, which affects certain muscles.

10. "Congestion fibrosis" is a newly described syndrome, which Howard Taylor has been working on for a number of years. He feels that it is a cause of pain more frequently than is recognized.

11. Pain caused by stones, strictures of ureters, and urinary type infection should always be eliminated before radical surgery is performed in the patient whose condition has not been satisfactorily diagnosed.

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EDITOR'S NOTE

The paper, "Pelvic Pain in Women—a Universal Problem," by Gilbert Douglas and associates, which appears in this Section on Pain should be of considerable interest to all readers, since the condition at one time or another afflicts every woman patient and, thus, constitutes a problem to the physician who sees her.

Comments on this Section on Pain, criticisms, and suggestions for papers will be most welcome. Physicians are especially invited to submit papers on subjects pertaining to pain for consideration. All inquiries and manuscripts should be sent to Dr. John S. Lundy, 102 Second Avenue Southwest, Rochester, Minnesota, or to the Editorial Department, THE JOURNAL-LANCET, 84 South Tenth Street, Minneapolis, Minnesota.

JOHN S. LUNDY, M.D.

Book Reviews on Pain

INHALATION ANALGESIA IN CHILDBIRTH, by E. H. SEWARD, M.A., D.M. (Oxon.), F.F.A.R.C.S., D. Obst. R.C.O.G., consultant anaesthetist, High Wycombe Group of Hospitals; and R. BRYCE-SMITH, M.A., D.M. (Oxon.), F.F.A.R.C.S., first assistant, Nuffield Department of Anaesthetics, University of Oxford, 1957. Springfield, Illinois: Charles C. Thomas, 58 pages. \$1.50.

This small book has compressed within it much information about the use of analgesia in childbirth. The work is intended primarily for the instruction of midwives, which means that the text necessarily had to be made more explicit than would be the case in a book planned for those with formal training in the subject. This objective has been attained.

The chapter on nitrous oxide presents concisely a considerable amount of historical facts and practical information about that agent. Trichloroethylene is well covered. There are chapters on causes of failure and on devices for administering nitrous oxide and air and also one on apparatus for administration of trilene and air.

There is a brief index. The regulations reproduced in appendices 1, 2, and 3 govern the use of analgesic agents and gas-air machines by midwives as well as rules restricting the practice of midwives. This book is excellent.

JOHN S. LUNDY, M.D.

HYPNOGRAPHY: A STUDY IN THE THERAPEUTIC USE OF HYPNOTIC PAINTING, by AINSLIE MEARES, MBBS., B. AGR. SC., DPM., 1957, Springfield, Illinois: Charles C. Thomas, 271 pages. \$7.75.

This book describes an aspect of hypnosis that is different.

JOHN S. LUNDY, M.D.

Current Literature on Pain

A STUDY OF HYPODERMIC NEEDLE POINTS, by F. FRANZ and R. M. TOVELL: *Anesthesiology* 17:724-729, 1956.

"Because of the introduction of new therapeutic agents requiring subcutaneous, intramuscular, or intravenous injection, the procurement of new needles and syringes has become a source of increasing expense to hospitals and physicians. At Hartford Hospital, over 60,000 needles have been procured in the last three years. During that period, demands placed upon the purchasing agent have increased by 50 per cent to the point where 1 needle is required per bed approximately every ten days. The cleaning, packaging, sterilizing, and issuing of needles to wards from central supply constitutes a major effort that is complicated by problems of collection and re-sharpening prior to processing for reissue. It is with the problem of sharpening that we are concerned in this communication

"The needle shapes which are satisfactory are those combining both strength and sharpness of cutting edge. Only 2 of the samples examined satisfy both these criteria One of these is a hypodermic needle point in its original form as received from a manufacturer The other is the point selected for development of a mechanical needle sharpener Both the needle and the grinding wheel rotate. It is so designed that as the needle rotates it lifts away from the wheel in order to preserve the cutting edges of the bevel. A convex bevel is produced and hooks curled backwards from the beveled surface are ground away."

From JOHN S. LUNDY and FLORENCE A. MCQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 67. Copyright by JOHN S. LUNDY.

FACIAL NERVE PARALYSIS AFTER GENERAL ANESTHESIA, by J. E. FULLER and D. V. THOMAS: *J.A.M.A.* 162:645, 1956.

"Attention has frequently been drawn to the danger that exists of producing damage to peripheral nerves in the unconscious patient by stretching or by pressure

"Case 1. A 54-year-old woman was undergoing cholecystectomy; she was moderately obese and her neck was short. During the induction of nitrous oxide-oxygen-ether anesthesia, upper respiratory obstruction developed This was only partly corrected by insertion of a rubber oral airway, but it was fully relieved when the lower jaw was lifted forward by bilateral digital pressure applied behind the angles of the mandible When the patient recovered consciousness, she was noticed to have a weakness of the left corner of the mouth, involving both the upper and the lower lips, and there was flaccidity of the left cheek The disability gradually lessened, and after three months full function had returned.

"Case 2. A 53-year-old man was being operated upon for inguinal herniorrhaphy; he was of heavy build and had a thick, short neck. Early in the induction of anesthesia with nitrous oxide, oxygen, and ether, obstruction of respiration at the pharyngeal level occurred. Because placement of a rubber oral airway failed to relieve the condition completely, forward digital pressure was applied behind the mandibular angles, and breathing was thereby

improved The next day, while shaving, the patient noticed that when he opened his mouth the right corner became pulled toward the midline Recovery was complete in three weeks

"This emphasizes the need for early tracheal intubation in patients whose airway can only be maintained by strong pressure applied to the lower jaw. These appear to be the first such cases reported in the English-language literature."

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VOMITING AND REGURGITATION DURING AND AFTER ANESTHESIA. SOME CAUSES, EFFECTS, PREVENTION AND MANAGEMENT, by JOHN ADRIANI: *J. Am. A. Nurse Anesthetists* 24: 231-238, 1956.

"Few happenings are as disconcerting to an anaesthetist as persistent postoperative emesis The problem resolves itself into two phases: that of emesis during anaesthesia and that of emesis in the postanesthetic period The majority of fatalities on the operating table are due to asphyxia. Aspiration of vomitus, blood and other secretions account for more than half the asphyxial deaths Vomiting is an active response in which some voluntary effort is involved. Regurgitation is passive and involves no voluntary effort

"Impulses which initiate vomiting may originate in almost any part of the body because the vomiting center is in communication with many nerves from many areas Many of the drugs used in anesthesia, particularly the narcotics and the general anesthetics, may stimulate the vomiting centers in the medulla Regurgitation not only occurs without voluntary effort but even when the vomiting center is depressed. Vomiting, on the other hand, does not occur if the vomiting center is depressed by anesthetics

"The management of the patient with a full stomach has been a matter of debate for sometime When surgery is urgent and the operation must proceed, the best expedient is to effect a rapid induction with cyclopropane or Pentothal with a muscle relaxant. Intubation of the patient using a cuffed tube is mandatory when vomiting is anticipated Regurgitation and aspiration into the trachea may occur silently and unknown to the anesthetist

"Berson and the writer working at the Charity Hospital in New Orleans introduced preoperatively into the stomach an insoluble dye, carmine red, which becomes soluble and red when made alkaline with ammonia. They noted that 15 per cent of 1,000 patients studied regurgitated the dye into the pharynx. In half of these, in other words, 7 per cent, the dye was identified in the trachea. The anesthetist was unaware of the regurgitation. The factors favoring regurgitation were as follows: (1) Difficult inductions (2) The presence of the stomach tube. The incidence was greater in patients who had Levine tubes in situ (3) Intubated patients showed an incidence of regurgitation close to 25 per cent (4) Patients who were in the head up position aspirated more frequently than those in the supine or head down position (5) The incidence of regurgitation using Pentothal and nitrous oxide contrary to our expectations was above the average of 15 per cent

"The statement has been made that fluid and vomitus cannot travel uphill. Obviously this statement is true, but one must remember that vomitus can be sucked uphill Vomiting during the recovery period is often ascribed to anesthesia. However, many factors besides anesthesia are involved, and anesthesia is only one of the many causative mechanisms."

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THE GERIATRIC PATIENT AND ANESTHESIA, by R. H. BARRETT: *J. Am. A. Nurse Anesthetists* 24:239-248, 1956.

"Just where does the geriatric age begin? Maybe we should be guided by the old adage that 'one is as old or as young as one feels' Anyone who is engaged in the administration of anesthesia is engaged in a dangerous profession. Every time you anesthetize a patient, the choice of life or death rests squarely in your hands, and it makes no difference whether you are a physician or a nurse. For this reason, it behooves all of us to know something about the people we are putting to sleep

"We are always dealing with an individual in the practice of medicine See your patient preoperatively—before he has had pre-anesthetic medication, preferably the day before surgery. If for no other reason than from the purely humanitarian standpoint, I urge that this visit be made by the anesthesia nurse as well as the anesthesiologist Tell the patient what he can expect—both before and after anesthesia and surgery Tell the patient what you are going to give him for anesthesia and approximately how you are going to give it. At least, tell him what the initial part of your procedure will be. If you have a post-anesthesia room or recovery room in your hospital, be sure to tell your patient that this is where he will be after surgery, so that when he awakens, he will not think he is in the wrong place Ask the patient about his previous anesthesia experience

"Having convinced—or attempted to convince—this individual that he has a better chance of living during anesthesia and surgery today than he has while crossing the street in front of the hospital after his convalescence, you proceed to order premedication, or, at least, check what others may have ordered for you. With the ever increasing popularity in the use of light anesthesia, for even the most major of surgical procedures, adequate premedication is more important than ever If someone else has ordered the premedication on the case you are going to do, be sure it is what you want for the patient you are going to anesthetize. You are a registered nurse, specially trained in anesthesia technology. You are about to embark on a life or death procedure, and it is expected that you will put to use all of the acumen that you have collected over the past several years of your life. If you do not agree with the premedication, or even the type of anesthesia that has been ordered by someone else, find out why it was ordered. It may be the best for the patient, but, be sure you know why. You are morally, if not legally, responsible for every patient you anesthetize

"If you work with an anesthesiologist, your problems

are reduced a hundredfold. If you do not work with an anesthesiologist, naturally, you will not emulate your surgeon on internist, but, you do have a right to know 'whys and why-nots' of what you are trying to do . . .

"The anesthetic technique, which, in our hands, for the past several years, has proved to be the safest for aged and debilitated patients is a combination of nitrous-oxygen and a muscle relaxant . . .

"Our technique is to start first an infusion of 5 per cent glucose in quarter strength saline solution in the adequately premedicated patient. We do not use scopolamine even in the very aged. Nitrous oxide and oxygen, in an 80-20 mixture, is administered for a few minutes by face mask. It is important to use non-rebreathing technique especially during the induction period, in order that bodily nitrogen will be replaced by nitrous oxide. Because nitrous oxide is a relatively mild analgesic, it is necessary to attain optimum concentration. The non-rebreathing technique also prevents build-up of carbon dioxide. After the patient is asleep, 20 to 40 mg. of succinylcholine are given intravenously through the intravenous tubing, and the posterior pharynx and larynx are sprayed with a topical anesthetic solution. This spraying can be done before induction, but the comfort of the patient is not disturbed by delaying it until the patient is asleep. For that very short period while the muscle relaxant and the topical anesthetic are producing their optimum effects, administration of nitrous-oxide and oxygen is resumed by face mask. A cuffed endotracheal tube is then inserted, under direct vision, and the patient is carried on hand-assisted respiration throughout most of the surgical procedure . . .

"Routine blood pressure, pulse, and often electrocardiographic tracings are followed. Intravenous fluids, including blood, are given as needed. On completion of surgery, the patient is allowed to awaken gradually . . . The practice of geriatric anesthesia today in any general surgical hospital is the practice of clinical anesthesia per se; and the practice of anesthesia itself, as a specialty, is and always has been not the specialized knowledge of what to do now, but rather, the acumen gained by study and experience which qualifies one to know what to do next."

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BASAL HYPNOSIS BY THE RECTAL ADMINISTRATION OF A MULTIDOSE THIOBARBITURATE SUPPOSITORY (Preliminary report), by S. N. ALBERT, H. N. ECCLESTON, JR., J. S. BOLING, and C. A. ALBERT. *Anesth. & Analg.* 35:330-336, 1956.

"The rectal administration of sodium Pentothal and sodium Surital in 10 per cent solution has gained some popularity as a rapid acting basal hypnotic in adults and children. The difficulties one encounters when administering rectal solutions has greatly limited the daily use of this technique . . . Sodium Nembutal suppositories are sometimes used for this purpose. The onset of action is slow and quite frequently the patient is agitated and difficult to control . . .

"It was desirable therefore to develop a simple and practical method whereby rapid-acting sodium thiobarbiturates could be administered rectally from stock

preparations in tailored doses for each individual patient with minimal discomfort. Sodium Pentothal or sodium Surital were incorporated in a suppository, cylindrical in shape and of uniform diameter and consistency. Each segment of the suppository contains a fixed amount of active ingredients, and the total amount to be administered depends on the length of the suppository used. The suppositories are inserted into the rectal pouch stimulating the procedure of taking a rectal temperature . . .

"Multidose suppositories containing sodium Pentothal were administered to 85 patients. Sodium Surital suppositories were administered to 65 patients. The results in both series were similar in effect and duration, so we incorporated both series into one total of 150 unselected cases with ages ranging from one month to 99 years . . .

"Rapid and accurate dosage determination for each patient is feasible without elaborate preparations. The onset of hypnosis is rapid, occurring within 5-10 minutes. Induction of anesthesia is smooth. There was no apparent depression of respiration, change in the blood pressure and the pulse rate after the administration of the suppositories. One may conceive a combination of slow and rapid-acting barbiturates incorporated into a multidose suppository in order to give a rapid induction and prolonged hypnosis utilizing tailored doses to fit the need of each patient."

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PUDENDAL BLOCK: TWO NEW TECHNIQUES.
by VIRGINIA APGAR: *Anesth. & Analg.* 36:77-78, 1957.

"In 1951, the technic of pudendal block was examined critically with the hope of improving its success. In order to perform a satisfactory block, it was necessary to palpate the ischial spine transvaginally on each side. It seemed a simple matter to direct a needle between the first and second fingers to this site, and to redirect it medially, to a point just inferior to the tip of the spine, then to insert it to a depth of 1 cm. and inject the anesthetic solution after aspiration to rule out intravascular placement . . .

"A second route for pudendal block has proved useful for certain gynecologic procedures and in males undergoing cystometric examinations. The posterior approach was suggested by observing the perineal anesthesia which was obtained during posterior femoral cutaneous nerve block performed by Lundy. The patient is placed in the Sims' position, and the upper leg is sharply flexed. A line is drawn between the posterior spine and the tip of the greater trochanter. This line is bisected by a perpendicular line, a technic similar to that used in sciatic nerve block. About 6 to 7 cm. downward on the perpendicular line, a needle is inserted and advanced in a slightly outward direction until bone is met. This bone is the posterior surface of the ischial spine on which lies the pudendal nerve . . . This approach has been considered too hazardous for obstetrical use, because of the proximity of the infant's head. Aspiration to identify the pudendal artery and vein is performed before injection of the anesthetic solution."

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The Journal Lancet

SERVING THE MEDICAL PROFESSION OF MINNESOTA,
NORTH DAKOTA, SOUTH DAKOTA AND MONTANA

Not by Bread Alone

WILLIAM S. MIDDLETON, M.D.

Washington, D. C.

IN ASSUMING THIS YOKE, I wish to make it clear that this is a medium of conduction and of communication and not a measure of personal subjugation.

To come to you today is indeed a privilege, and I would take the prerogative, indeed, without compunction, of changing the trend of your thought, if possible, to the past and not to project it into the future as has been done in the past two days. It is significant that the beginnings of the modern therapy of tuberculosis had rather insecure foundations. We are all familiar with Thomas Sydenham's preachments of horseback riding and exercise in general in the seventeenth century, which were the prescription not only by choice but of necessity. The very beginning of modern therapy of tuberculosis may be traced to George Bodington's suggestion in 1840 that the tuberculous patient be sent to hospitals built in the country. In his treatment of pulmonary consumption, he therefore felt that there was the necessity for an environment different from that of the urban hospitals. To George Bodington goes the chief credit for the initiation of the sanatorium movement. This found direct expression in the suggestions and the activity of Herman Brehmer at Görbersdorf in 1859, when the rural sanatorium was begun in Germany and physical exercise was continued at varying levels.

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Indeed, the exercise was extended to such a degree that his student, Peter Dettweiler, differing from the master, started his own sanatorium at Falkenstein in 1875. Dettweiler really set the pace for the more modern conception of sanatorium treatment. Of course, there is the work of Carl Spangler at Davos in Switzerland, again in the same vein, and then in our own country, there is the work of Edward Livingston Trudeau at Saranac that so greatly influenced the movement for the treatment of the tuberculous patient. The "Little Red" sanatorium was the beginning, and a great influence on medical thought and action in this country stemmed from the movement initiated by Trudeau. His immediate pupils and his co-workers, Lawrason Brown and Edward Baldwin, are familiar to all of you.

The tradition of Trudeau has been carried down in the generations intervening from 1885, when he commenced his sanatorium, which was a true movement for the modernization of treatment as it was recognized at the time. In general, all this period is B. K., that is to say, *Before Koch*. In that particular direction, we have living examples. I would single out Dr. J. Burns Amberson, except for the fact that in the December number of the *Review*, I understand from a very eminent authority, James Waring, that he has taken to making mousetraps. In any event, this movement, which carried over into the present era, had begun before Koch. When Koch made his observations on the discovery of the tubercle bacillus in 1882, he attempted to apply that information to treatment. The story of old tuberculin is familiar to all of you. With-

out denying to Robert Koch his tremendous contribution, it became obvious early that old tuberculin was not to be an essential element in the treatment of tuberculosis.

Then came the intervention of surgery. For the beginnings of thoracic surgery, Carlos Forlanini introduced the pneumothorax in 1892 or 1895. The date depends on whether Garrison or Long is considered the authority. Succeeding him and supplementing him independently, John B. Murphy popularized the method in this country in 1895 or 1898, depending again on whether Garrison or Long is your authority. In my student days, more radical measures of therapy included Schede's very active work and, later, the catalyzing effect of World War I was felt. It so happened that as the medical man on a chest surgical team in World War I, I was thrown into close contact with thoracic surgeons. Under Major, later Lt. Col., John L. Yates, I had the opportunity to meet men who were making history in this area of surgery: namely Gask, the Englishman; Lockwood, the Canadian; and Tuffier, the Frenchman. These surgeons were working under terrific handicaps, because the support of anesthesia was not always secure and none of the antimicrobial agents was yet available. Lilienthal, another American, did notable work in that period. Saucerbruch, a German, often denying contact with the outside world, was a notable contributor. I would like to pay tribute to a giant among them all — John Alexander — who, in my judgment, in the post-World War I period, gave the greatest impetus to surgery of the lung in this country. He influenced more individuals than any other surgeon in this field. John Alexander and Ewerts Graham were the great leaders of the movement in this country.

The period of which we are speaking is, of course, the period B.C., that is to say, *Before Chemotherapy*, or I might, if I had been a little bit more prompted in taking poetic license, have said B.W., *Before Waksman*. This innovation has initiated an entirely new viewpoint in our treatment of tuberculosis, not only from the medical but also from the surgical standpoint. Those of you who have gone through the pre-antibiotic, preantituberculosis drug or B.C. period have a clear appreciation of the advantage that has been given us by streptomycin, para-aminosalicylic acid, isoniazid, cycloserine, Pyrazinamide, and the other agents used in this particular direction. Without them, the surgery of tuberculosis would revert to the immediate post-World War I period. We have the great advantages of anesthesia and of the antimicrobial agents.

From our present vantage point, it is important to view the past as well as the future. The battle is not won, and we cannot rest on our oars in the assumption that things will go forward at the accelerated rate of the recent past. Are we losing some of the advantages of the B.C. period? By dependence upon physical and chemical agents, are we losing some of the advantages that the patients had at an earlier stage? I think the answer to both these questions is in the affirmative. It behooves us to look carefully to ourselves to determine in what measure these advantages may be regained. In the first place, it is accepted as an axiom that there is no tuberculosis except from a tuberculous subject. There must be a source and then a susceptible host. It is important in this concept that we view the subject realistically. The ideal of tuberculosis control is admittedly prevention. Are we as carefully screening our populations as we did B.C.? Are we as carefully educating the public and the profession as we did? Whether we wish to admit it or not, the great advance in the preantituberculosis drug period, B.C., was in the education of the laity, to which the profession reacted rather slowly. In this educational movement, we must not relax one iota as we look to the future. In the next place, it is apparent that the early recognition or case-finding of tuberculosis is a vital issue. Even if we have given every consideration to preventive measures, including use of BCG in its place, instances of tuberculosis will continue to occur until the sources are wiped out—the millennium of prevention. Early recognition by proper screening methods is familiar to all of you; we must never neglect them. They may appear less spectacular and more humble, if you please. Nevertheless, they are the keystone to the ultimate control of this disease, and then, in turn, follows the proper application of treatment. We will not deny for a moment that under sanatorium management of rest, adequately balanced nutrition, and fresh air, there were certain advantages. Do not lose them simply because we have other more ready measures, which may actually be short cuts. In the last analysis, there is still an advantage to be gained by sanatorium management.

We realize that in this program of early tuberculosis control, there is the necessity for a close rapport with the patient. This represents first a matter of the education of the patient, his family, and the community. No longer is the tuberculous patient a pariah in society. We have definitely gained that vantage point. Furthermore, the long term of this illness has been a challenge which has been met by educational

methods from the beginning. In the conquest of the disease, the patient must conquer himself before he starts to conquer his illness. The family educated to the point of accepting its particular responsibility, the community accepting its place, and the patient educated to the limits of his capacity to accept information constitute a team of resistance. This is the keynote to the proper rapport between the patient and the physician. The physician must realize the psychology of the ill and appreciate that they are peculiarly ego-centric. In spite of the traditional *spes phthisica*, we know that each patient will have to be trained to meet the situation with which he is confronted. Unless there is an intimacy of contact between physician and patient, we will not have gained our primary objective of the cooperative therapeutics so necessary for complete care.

There are a number of points of obvious weakness in our present pattern. We may take first the debit side of the sheet for the physician. It must be realized that the patient is distressed when he finds the physician more interested in the etiology than in the host of the disease. He is immediately disturbed when the physician, too technical to come into grips with his patient's problems, loses contact in his abstraction. It is perfectly true that we wish to advance scientifically; but the meticulous details of the laboratory must not come between the physician and this human subject of disease. "For this is the great error of our day in the treatment of the human body, that physicians separate the soul from the body." That is not a personal statement but a quotation from Plato. The day is somewhat removed; but, the fact remains that we cannot afford to permit any barriers to come between us and the patient. This patient-physician relationship is never more intimate than in the care of the tuberculous individual. We turn to the credit side of the column. Let there be good cheer in the contact with the patients. May we never bring gloom to the sick room. Furthermore, the appreciation of the necessity for interest in the patient's welfare by the utilization of every agency is imperative. We in the Veterans Administration are not working in a vacuum in this particular subject and field. We have the support of the psychiatrists, clinical psychologists, and the great help of the supporting cast in physical therapy, occupational therapy, nursing, special services, and social service. We have the library, and we have the clergy. Do not minimize any one of these elements, because this

patient entrusted to our care is one who is detached from his place in society. Unless we attempt to fill that void, we may, in truth, be working in a vacuum. We turn to the institution itself. There is a very definite personality in hospitals. Let yours be a warm, cheerful atmosphere rather than a cold, impersonal type.

It is perfectly true that we all have problems. Whether in the Army, Navy, Air Force, United States Public Health Service, civilian institutions, or the Veterans Administration, the problem of the irregular discharge presents itself. Every irregular discharge is a discredit to the manner in which the patient has been treated. Do not misunderstand me. I do not think that all problems are soluble. There are many of these problems that have grown over the years; but they are on the debit side of the ledger because, first, adequate therapy has not been provided for that given individual. In the second place, he has been returned, a potential source of infection, to home and society without arrest or adequate treatment of his condition. I am greatly distressed when I go into our institutions and find that there is a patient, or patients, who refuse to undergo surgery. That does not mean that the staff is always at fault; but it occurs to me that there is a breakdown in the fine chain of communication between medicine and surgery and the patient. In each instance where morale is in question, where there is a barrier between patient and physician, we should look first to ourselves for the source and the answer. It is perfectly correct to turn our clinical psychologists and psychiatrists loose on this group of patients. They have given us a great deal of information and assistance in this area. In this breach, there must be an answer, and we should attempt to ascertain it. Certainly, as we grow larger, as our institutions become more and more involved, an atmosphere of impersonality may prevail. If this be the case, there is always the difficulty, first for the patient, then for the family, then for the community, to make their necessary contributions to what I have termed cooperative therapeutics. It behooves us, then, to take to heart the facts that we have made great gains in medicine and surgery and that the advantages of these advances to the individual suffering from tuberculosis are stupendous. However, so that we may not compromise this advantage, we should look to the various supporting elements and remember that we cannot depend on the medicine and surgery alone to effect the cure.

The Development of Tuberculosis in a Controlled Institutional Environment

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PRESENT PROGRAMS of tuberculosis prevention in controlled institutional environments consist primarily of screening and diagnostic procedures. Admission and periodic chest x-ray films, initial tuberculin tests with regular repeat testing of negative reactors, as well as bacteriologic examinations in suspected cases, are the accepted routine. Within recent years, chemoprophylaxis of children who are recent converters is a growing adjunct.¹ Some directors of programs are even giving adults the benefits of the latter routine.² The slowly declining morbidity of tuberculosis in this country³ and the redirection of programming in some communities^{4,5} will perforce result in a continuously lowering tuberculosis disease potential for all institutions.

It was considered that an evaluation of such institutional programs would indicate to some degree the effectiveness and usefulness of the various facets of a control program. Two institutions were studied. One is a 5,000-bed facility for the care of the mentally retarded, the Dixon State School, Dixon, Illinois. The other is the 516-bed Veterans Administration Research Hospital, Chicago, Illinois. The former is a part of the State Welfare Department, and the latter is a university affiliated general hospital. They will be considered separately, since they are dissimilar in patient populations and with somewhat different control programs.

DIXON STATE SCHOOL

Dixon State School draws its residents, as the patients are called, from Cook County and the counties to the West and Northwest. It is like a town in some respects. The residents live in one-story dormitory cottages. There is a general, communicable disease, and tuberculosis hospital, as well as facilities for education, recreation, and rehabilitation.

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Prior to 1952, there had been sporadic tuberculin surveys, the first occurring in 1943. Annual chest x-ray films were instituted in 1947. In 1952, both 70 mm. films and tuberculin testing which utilized the intracutaneous injection of a 1 to 1000 dilution of Illinois State Health Department old tuberculin were instituted for all residents on a semiannual basis. Of importance is the fact that the key personnel involved have remained. Information concerning the newly diagnosed cases of tuberculosis for the period 1952 through 1956 and of all cases of active disease for the previous five years was obtained. In addition, the results of tuberculin tests on new admissions during the 1952-1956 period were studied.

During 1947 through 1951, a total of 115 individuals were diagnosed as having active tuberculosis. Of this number, 64.4 per cent were males, some 8 per cent above the average male census. Of the 112 total with pulmonary infections, 44 or 39.2 per cent had minimal disease, 50 or 44.6 per cent had moderately advanced, and 18 or 16.7 per cent had far advanced tuberculosis.

For the period 1952 through 1956, when an intensified case finding program was instituted, a total of 65 new cases of tuberculosis were found, primarily through the x-ray program. In addition, 18 individuals had relapses of previously "stable" disease. The seeming paradox is that fewer cases were found during a period of more intense search. The percentage of males remained constant—64 per cent of 80 patients with pulmonary disease were men—57.5 per cent had minimal infection, 32.5 per cent had moderately advanced, and only 10 per cent had far advanced disease. There was, however, an 18 per cent increase in diagnosed minimal cases.

Table 1 emphasizes the difficulty of making a definite diagnosis of active tuberculosis even in an institutional population. The time lag is a serious handicap for control programs, especially in the free-living population.⁴ Within this group of 65 cases, there were 7 deaths. Three were caused by tuberculosis, 1 had an initial diagnosis

TABLE 1
MONTHS TO DIAGNOSIS OF 65 CASES NEWLY DIAGNOSED
DURING 1952-1956, BY DIAGNOSTIC CATEGORY

Months to Diagnosis	Minimal	Moderately Advanced	Far Advanced	Other	Total
0 to 2	15	11	4	2	32
3 to 5	14	6	0	1	21
6 to 8	8	1	0	0	9
9 to 11	1	1	1	0	3
Total	38	19	5	3	65

TABLE 2
LENGTH OF STAY IN INSTITUTION PRIOR
TO DEVELOPMENT OF TUBERCULOSIS
1952-1956

Number of Years	Number of Patients
<1	3
1 to 2	0
2 to 3	0
3 to 5	3
5 to 10	16
10 to 15	22
15 to 20	8
20 to 30	12
30+	1
Total	65

of far advanced disease, and 2 were diagnosed as having minimal infection. Rapidly progressive disease developed in the latter in the face of maximum therapy.

The tuberculin history of the 65 individuals revealed that all were tuberculin positive at time of diagnosis. However, further evaluation showed that 19 had come to the institution with negative skin reactivity. Four persons had tuberculin conversions during the one year prior to development of active disease, 1 case converted within the previous two years, and 2 individuals converted during the previous three years. Of the total, tuberculosis developed in the majority some years after admission, as shown in table 2. Two of the 3 patients who were reported to have active disease within the first year revealed active tuberculosis at time of admission.

The 1,472 admissions for the period 1952 through 1956 were studied. Of this number, 951 came from Cook County and 521 from the other counties. Since the population characteristics in Cook County are significantly different from the rest of the population area, all data were separated. Of the total admissions, 529 were not

residents of the Dixon State School as of January 1, 1957, because of death or absolute or conditional discharge from the institution and were excluded from the study of this group. Sixty-one per cent were under age 10, and 21 per cent were age 20 and over. It was considered that the status of the tuberculin reaction played no part at all in their permanent or temporary absence. Thus, the remaining 943 were evaluated.

Table 3 presents, in condensed form, a summarization of the raw data. There was the expected sharp rise in the ratio of positive reactors with increase in age. The total number of persons with initial positive tests is small, reflecting the preponderance of children in the new admissions studied during this five-year period.

There were 56 tuberculin conversions in the 804 individuals with initially negative skin tests. Table 4 shows the period of communal contact prior to the tuberculin conversion. It was noted that there was no particular living, educational, recreational, or rehabilitation area that produced any unusual number of converters. Except for 7 instances in the Cook County group, all converters were over 15 years of age. None received chemoprophylaxis. Clinical and x-ray evidence of active tuberculosis had developed in 2 adults, 2 out of 33 tuberculin conversions in age group over 20.

The tuberculosis control program for employees entails an initial tuberculin test with no retesting of negative reactors. There are routine pre-employment chest x-ray films, which are followed by a minimum of semiannual chest x-ray films for all employees. During 1952 through 1956, active disease developed in 2 employees who had been working for some years. Both were considered to have had evidence of "healed" tuberculosis infection. An even more important service has been the uncovering of suspected disease in a number of applicants and their referral to appropriate health agencies.

VETERANS ADMINISTRATION RESEARCH HOSPITAL

The Veterans Administration facility, on the other hand, is a general hospital treating adults only. It is located in the major source population area of the Dixon State School. The hospital routine consists of a chest x-ray film only on patients as they are admitted or as soon afterward as possible. There is the well-known chest x-ray film program for all employees and, in addition, a tuberculin testing program consisting of an initial test with periodic retesting of negative reactors. Prior to July 1956, the 2-strength PPD technic was utilized. Subsequent to the above date, a single test with intermediate

TABLE 3
INITIAL TUBERCULIN TESTS AND CONVERSIONS BY SOURCE POPULATION, AGE GROUP, AND SEX

	Age groups	Male		Female		Total	
		Initial tests	Conversions	Initial tests	Conversions	Initial tests	Conversions
Cook County	+	5		10		15	
	0-9 -	196	0	125	3	321	3
	+	14		7		21	
	10-19 -	65	10	66	4	131	14
	+	32		23		55	
Other counties	20+ -	25	5	39	10	64	15
	+	2		0		2	
	0-9 -	94	0	61	0	155	0
	+	11		2		13	
	10-19 -	53	3	45	3	98	6
County totals	+	22		11		33	
	20+ -	26	9	9	9	35	18
	+	7		10		17	
	0-9 -	290	0	186	3	476	52%
	+	25		9		34	
	10-19 -	118	13	111	7	229	28%
	+	54		34		88	
	20+ -	51	14	48	19	99	20%
							33

TABLE 4
DURATION OF INSTITUTIONAL STAY PRIOR TO TUBERCULIN CONVERSION

	Sex	Months					Total
		0-5	6-11	12-23	24-35	36+	
Cook county	M	0	2	5	6	2	15
	F	2	3	5	5	2	17
Other counties	M	1	2	5	2	2	12
	F	0	2	3	2	5	12
Total		3	9	18	15	11	56

TABLE 5
CLASSIFICATION OF EMPLOYEES ACCORDING TO EXPOSURE, GROUP, OCCUPATION, AND SEX IN V.A. RESEARCH HOSPITAL
OCTOBER 1, 1956

	Total Persons	Positive		Tuberculin test Negative		Not tested	
		Male	Female	Male	Female	Male	Female
Grand total	752	288	219	83	139	19	4
Group A	28	14	10	3	1	0	0
Group B	724	274	209	80	138	19	4
Physicians	66	28	2	15	0	19	2
Nurses	117	1	60	0	56	0	0
Attendants	112	66	33	15	8	0	0
Laboratory personnel	48	17	9	10	12	0	0
Other	371	162	105	40	62	0	2

TABLE 6
PERSONNEL HAVING NEGATIVE TUBERCULIN TESTS ACCORDING TO
AGE, OCCUPATION, AND RACE IN V.A. RESEARCH HOSPITAL, OCTOBER, 1956

	<i>Total persons</i>	<i>White</i>				<i>Non-white</i>			
		<i>Total</i>	<i><30 yr.</i>	<i>30-49 yr.</i>	<i>50+ yr.</i>	<i>Total</i>	<i>30 yr.</i>	<i>30-49 yr.</i>	<i>50+ yr.</i>
Grand total	222	154	81	57	16	68	39	25	4
Group A	4	2	1	1	0	2	2	0	0
Group B	218	152	80	56	16	66	37	25	4
Physicians	15	15	7	8	0	0	0	0	0
Nurses	56	56	44	12	0	0	0	0	0
Attendants	23	2	0	1	1	21	11	10	0
Laboratory personnel	22	18	10	7	1	4	4	0	0
Others	102	61	19	28	14	41	22	15	4

strength had been employed. A summary of the tuberculin status of all employees as of October 1, 1956, is presented in tables 5 and 6. Group A was comprised of those who had practically no contact with patients and was quite small in number at that time, only 28 of 752.

The information obtained on the entire group, which was composed of all types of general hospital personnel who had been present for varying lengths of time since the hospital opened in November 1953, does not mirror the effect of the institution upon them. However, a summation of the results of tuberculin testing of new employees and retesting at three-month intervals for all within group B and at six-month intervals for group A, in a hospital that does not admit known cases of tuberculosis except in an occasional temporary emergency, suggests that the tuberculin conversions, as shown in table 7, are a function of the endemic area in which the hospital is located. Of the 2 professional groups most closely associated with patients, a tuberculin conversion developed in only 3 of the 80 nurses and 2 of the 13 doctors retested within the year, October 1, 1956, to October 1, 1957. Of the 51 employees in the group with minimal contact with patients, 7 showed tuberculin conversion, and 15 of the remaining 142 employees in group B also presented evidence of a new subclinical tuberculous infection.

DISCUSSION

The basic question that arises concerns the function and purpose of the tuberculin test. In cases of pulmonary or other systemic diseases in which tuberculosis is a differential diagnosis, the tuberculin test is a highly specific diagnostic procedure.⁶ However, the testing of either employees or resident patients in an institution and faithful recording of the results does not in it-

TABLE 7
SUMMATION OF ONE YEAR'S TUBERCULIN
RETESTING, BY EXPOSURE GROUP AND OCCUPATION

<i>Exposure group and occupation</i>	<i>Total</i>	<i>Tuberculin reaction</i>	
		<i>Positive</i>	<i>Negative</i>
Group total	286	27	259
Group A	51	7	44
Group B	235	20	215
Physicians	13	2	11
Nurses	80	3	77
Attendants	40	5	35
Laboratory personnel	22	2	20
Others	80	8	72

self add anything to the control of tuberculosis. Why do a tuberculin test?—tradition or more information? How is it to be used? In children, a recent tuberculin conversion may result in chemoprophylaxis as well as the usual investigation of intimate contacts to possibly uncover the source of the new tuberculous infection.

The report of the cooperative study of some 2,700 children under the sponsorship of the United States Public Health Service was encouraging. These recent converters were separated into two groups; one received chemoprophylaxis and the other a placebo. There was a significant reduction in the incidence of evident tuberculous disease in the treated group. Could not the same be done with adults? Certainly, they are not less important. In reality, do we know now, with the changed clinical characteristics of tuberculosis as well as ecology, the chances of active disease developing in a free-living or institutionalized adult within either months or years after the first invasion by the tubercle bacillus? Would the effect of chemoprophylaxis be similar to that observed in children? The long-term effectiveness of any tuber-

culosis control program must be an integral part of planning. Tuberculosis constantly reminds us that it frequently lives as long as its host.

The observations presented suggest that the disease in the institution, as in the free-living community, develops primarily in those who have had contact with tubercle bacilli years before they entered the institution or came to our attention. The problem of tuberculin conversion was significant in the adult group in the Dixon State School, reflecting institutional infections in spite of an intensive control program. The part that subclinical infection plays in individuals without roentgenographic evidence of active disease is a moot point.

Patients or residents in an environment such as the Dixon State School are in much more intense social contact with their peers than in any free-living community. The finding, during 1952 through 1956, of a fewer number of individuals with tuberculosis than diagnosed prior to the intensified campaign emphasizes the question of subclinical dissemination, the real contribution made by the yearly x-rays of all residents for the period 1947 through 1951, and the reasons for doing and ignoring the tuberculin test. The Veterans Administration Research Hospital experience is considered to be primarily a reflection of the tuberculosis endemic in the external community. A tuberculin testing program in an in-

stitution does the same for the institution. In the latter instance, however, the opportunity is at hand for doing something about the offending community.

SUGGESTIONS

1. Utilize intermediate strength PPD or its equivalent for all tuberculin surveys in order to facilitate comparability of studies.
2. Initiate a cooperative study for adults similar to that just reported for children.
3. Institutions might attempt to segregate their present patients or residents with negative tuberculin reactions and allocate tuberculin negative new admissions and ward or cottage personnel to such units.
4. An intensive study of institutionalized adults might clarify a few of the reasons why only some individuals suffer clinical relapse.
5. A considerable number of adults in whom clinically evident tuberculosis does not develop probably have periods of subclinical infectiousness, and the frequency parallels the present sex and age specific morbidities.
6. The chemotherapy of abeyant tuberculosis may be as rational as the specific treatment of latent syphilis.
7. The incidence of active tuberculous disease in recent adult tuberculin converters is also significant, especially in institutions.

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BACTEREMIA caused by gram-negative bacilli occurs fairly often in patients with diabetes mellitus. Fasting blood sugar determinations for patients with such bacteremia and blood cultures for diabetic patients with unexplained fever are recommended.

The urinary tract is usually implicated as the source of infection, so that prophylactic antibiotic therapy is advisable if any operative procedure or manipulation of the urinary tract is contemplated. Vigorous antibiotic treatment is mandatory if urinary infection exists. A combination of a streptomycin compound and one of the tetracycline group of antibiotics is recommended for treatment of gram-negative infections.

Of 137 patients treated for gram-negative bacteremia, 14 also had diabetes mellitus. The coli-aerogenes group of organisms was responsible for the infection in 12 of the 14 diabetic patients, and the urinary tract was thought to be the source for invasion of the blood stream in all but 1 patient.

WILLIAM J. MARTIN, M.D., JOHN A. SPITTEL, JR., M.D., WILLIAM M. MCCONAREY, M.D., and WARREN A. BENNETT, M.D., Mayo Clinic, Rochester, Arch. Int. Med. 100:214-220, 1957.

Children of America Need Our Help

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THE AMERICAN SCHOOL HEALTH ASSOCIATION with more than 6,000 members operates in a most fruitful health field from the standpoint of America's most important asset—the good health of its people.

In this country in 1954, there were 16,000,000 preschool children, 27,118,000 from 5 to 14 years old, and 12,854,000 from 15 to 19. In our schools, there are 1,000,000 professional and 200,000 non-professional workers. Thus, the children and school personnel members numbered 57,172,000—approximately one-third of the nation's population.

Human minds are never so impressionable and so retentive as during the period of childhood. It is a common observation that throughout life people have clearer and better memories of their childhood experiences than of those which occur subsequently.

Just now I am enjoying some of my most pleasant experiences to date from work done for children, which emphasizes their retentive memories. In 1921, while chief of the medical staff of a new special school for tuberculous children, the opportunity came to examine and observe children for the next quarter of a century when more than 19,000 were examined. One of our present research problems consists of locating, inquiring about their health, and examining these former children. Although many now reside at distant points, the response to our inquiry has been most gratifying. When located, some have inserted special notes on the questionnaires; others have written long letters expressing appreciation for our efforts to help them when they were little children. They have vivid memories of just how they were examined, exactly what was done, and the advice given them. It is the receptiveness and retentiveness of the child's mind which makes health work for children so worthwhile.

It is encouraging to learn how these individuals, many of whom had lost one or both parents

or other members of their families from tuberculosis, have adhered to the health principles they were taught as children. Not only have they had periodic examinations, but they also have provided them for their children and, in some instances, their grandchildren. Thus, tuberculosis in their generation has been far less destructive than it was among their parents and grandparents.

Although equal opportunities exist in all aspects of health work, my remarks will be limited largely to the disease whose germs have taken refuge in the bodies of more of the 57,000,000 children and personnel of our schools than any other major pathogenic organism.

APPOINTMENT OF COMMITTEE ON TUBERCULOSIS

When Dr. Charles H. Keene was president of the American School Health Association in 1934, he recognized the seriousness of this problem, not only in the schools but also in the nation. That year he appointed a Committee on Tuberculosis. This disease was then, as now, a serious national defense item. Dr. Keene realized there was no possibility of solving the problem quickly, but he was confident that it could be overcome through America's educational system. By enlisting the support and cooperation of the 1,000,000 teachers and arming them with the facts about tuberculosis, that generation of children should be so protected against and informed about this disease that they could go through life suffering less destruction from it than any previous generation. Moreover, each succeeding generation of children would become freer from tubercle bacilli. When Dr. Keene appointed this committee, generations that had already passed through the schools were suffering terrible losses from tuberculosis. Its mortality rate in the nation as a whole was 58.5 per hundred thousand. Sanatoriums everywhere were filled to capacity and numerous persons on waiting lists had to remain in their homes. Thousands had unknown but contagious tuberculosis. In cities, 20 per cent or more of the grade school children and in colleges, even in the Midwest, approximately one-third and in some of the eastern states more than one-half of entering students had been contaminated with tubercle bacilli.

Read on the occasion of the presentation of the William A. Howe Honor Award by the American School Health Association, November 13, 1957, Cleveland, Ohio.

It was Dr. Keene's great hope that his Committee on Tuberculosis might develop a program which would help solve this problem. It is of historic interest that the first meeting of the committee was held at Saranac Lake, New York, in the former residence of Dr. E. L. Trudeau, who wrote the following in 1905: "Education should begin by teaching in the public schools the main facts relating to the transmission of tuberculosis, insisting in such teachings on the value of hygienic measures of prevention."

COMMITTEE DELIBERATIONS AND RECOMMENDATIONS

During its early meetings, this committee considered various activities, hoping to find one that would be practical and could be employed everywhere with assured success. From the beginning, the members strongly recommended employment of the tuberculin test among school children everywhere. One of its activities consisted of producing a map of the United States indicating the incidence of tuberculin reactors among school children. This map was published in the bulletin of the National Tuberculosis Association in 1937 with the thought that it would stimulate interest and activity in tuberculin testing in the schools throughout the country. Up to that time, tuberculin testing had been quite spotty, and not a great deal of information was available. However, it was anticipated that it would soon be used extensively and that the map would show improvement from year to year.

As this project was well underway, almost fanatic enthusiasm for x-ray film inspection of the chest without tuberculin testing or any other phase of an examination swept the country. Members of the committee, who previously had had extensive experience with x-ray inspection and were cognizant of its serious limitations, knew such a procedure could not possibly solve the problem. Although attention was called to these limitations, they were ignored and enthusiasm for x-ray film inspection alone ran so high that tuberculin testing came almost to a standstill.

For a while, except in a few places, it was well-nigh sacrilege to mention the tuberculin test. Even secretaries of tuberculosis associations referred to the absurdity of administering this test when the disease could be directly detected with the x-ray film. They had not been informed that the ordinary x-ray film of the chest enables one to visualize only 75 per cent of the lungs; that areas of disease must be gross and have adequate consistency to obstruct x-rays before they cast visible shadows on films; that the

cause of a disease can never be determined from the x-ray shadows it casts; and that 10 per cent or more cases of tuberculosis have extrathoracic locations.

The committee knew that the tuberculin test is the most accurate diagnostic procedure available; that it detects tuberculosis long before most lesions evolve sufficiently to cast x-ray shadows; that only persons who react to the test become ill from the disease. Therefore, it was futile to look for tuberculosis where it does not exist by making x-ray film inspections of the chests of persons who do not react to tuberculin.

It seemed likely that the flurry of enthusiasm for x-ray film inspection alone would soon subside and workers everywhere would return to a fundamental program. Therefore, the committee proceeded to recommend tuberculin testing everywhere despite its unpopularity.

CERTIFICATION OF SCHOOLS PROPOSED

In 1940, it was proposed that a project be devised whereby schools would be certified on the basis of tuberculosis control work in progress. Of all the programs that had been discussed since 1934, certification of schools seemed the best. If it could be properly organized, more could be accomplished toward tuberculosis eradication than anything that had ever previously been employed. It could not only eliminate clinical and contagious tuberculosis from the schools, but it could also provide fundamental information to personnel and students alike which would be valuable throughout the remainder of their lives.

FIRST SCHOOLS CERTIFIED

It was thought that the certification of schools project should be given a thorough trial in one state before it was recommended nationally. A state was selected in which tuberculin testing had not been given up entirely for x-ray inspection. Qualifications for certification were established, and the first group of schools was certified on October 15, 1945. For the period of the demonstration in that state, the Committee on Tuberculosis, American School Health Association, appointed a state subcommittee consisting of three physicians. An arrangement was made whereby this subcommittee worked in close cooperation with the state Tuberculosis and Health Association. In that state, certification of schools was found to be the most effective method of stimulating interest and promoting activity in tuberculosis work that had ever been employed. Moreover, it insured an over-all response never previously experienced. It remains

a major activity of that Tuberculosis and Health Association.

CERTIFICATION INSURES EXCELLENT RESPONSE

The school certification project has been adopted by several states. Wherever it has been used, it has spelled the doom of the tuberculous teacher, bus driver, other employees, and even the high school student from spreading tubercle bacilli in the school and community. The subject of the project suggests that work is limited to the schools. In reality, the school is the center of activity, but the work is often extended to include entire communities which the schools serve. For example, when children are found to react to the tuberculin test, sources of their infections are sought among their adult associates, such as parents, maids, farm hands, and grandparents. Entire communities become interested in tracking down the source of infection in the school children. This is a first-class method of finding clinical cases of tuberculosis in the community. For example, Wood and Mantz sought the source of infection of tuberculin reactors among the kindergarten and first grade children in Kansas City, Missouri. By this method, they located 10 times more contagious cases of tuberculosis than had ever been found by any other method, including mass x-ray surveys. This is not a new epidemiologic method. It has been in practice in a few places with excellent results for more than thirty years. School certification insures its much wider use.

The program is now so well-established and has been in operation sufficiently long that there is no question about its value.

Apparently some members of our own organization are not aware of the qualifications for school certification. Some have said that it would not be possible to adopt this program because there is so much tuberculosis in their areas. Certification is based on tuberculosis control work in progress. The number of tuberculin reactors found or the number of cases of clinical tuberculosis discovered has nothing whatsoever to do with certification. The qualifications only include testing of 95 per cent or more of the students and 100 per cent of the personnel, x-ray film inspection of the chest of all high school and personnel reactors, and seeking the source of infection of student reactors. Indeed, if every student and every personnel member reacted to tuberculin and 25 per cent had evidence of clinical disease, such a school could be certified because the testing and other qualifications had been met.

A physician wrote that it would be impossible

to certify the schools in his state and, particularly, in the area where he operates a sanatorium because of the small response. He has administered the tuberculin test in schools for many years but only to freshmen and senior high school students. He stated that the response varies from school to school and from year to year and that 80 per cent is considered good. Experience has proved undeniably that response of students and personnel is directly in proportion to the amount of effort put into the project before examinations begin. Apparently, it is generally true that if an announcement is made that on a certain day a physician or nurse will offer the tuberculin test, the response often does not exceed 50 to 60 per cent. Under such circumstances, 80 per cent would be exceedingly high. However, the 95 per cent plus response among children and 100 per cent response in personnel have been readily obtained in many places where adequate preparation has been made. For example, we began testing with tuberculin in a selected group of city schools in 1926 and retested in the same schools approximately every ten years to determine the effectiveness of the general tuberculosis control program in the area. In 1926, 1936, and 1944, an announcement was made only a few days before that on a certain day the tuberculin test would be administered. The children were to bring signed consents from their parents. Although the response was reasonably good, it was never satisfactory. In 1954, it was decided to offer these 24 schools certificates if they met the qualifications. Therefore, an intensive educational campaign was conducted over a period of about two months. The nursing staff of the health department and others participated. They met with parent-teacher organizations and conferred individually with principals of schools and other administrators. They distributed explanatory printed material among parents and the entire school personnel. Educational workers of the State Tuberculosis and Health Association arranged for newspaper articles, radio and television broadcasts, and a special printed pamphlet describing the tuberculin test was distributed to parents and school personnel. An excellent organization was formed in each school for the actual testing in which mothers and health chairmen played an important role. The whole procedure was thoughtfully and carefully developed from the time of its announcement to completion.

School and community pride spurred personnel, parents, and the children themselves on to the certification goal. It served as a powerful incentive. For example, in the first school tested,

1 teacher did not respond. On the day the tests were read, seventy-two hours later, she was the first to appear and requested the tuberculin test, stating that she could no longer take the goading of other members of personnel, parents, and even several children who asked her if she was going to prevent their school from receiving a certificate. In another school on the morning the test was given, a kindergarten teacher informed the principal that 6 children in her room were absent. The principal called each mother by telephone and urgently requested that the children be brought in at least long enough for the test. Five promptly responded.

When the examinations actually began, the response was almost unbelievable. Among the 11,984 children, 98.7 per cent responded, and, in 23 of the 24 schools, 100 per cent of the personnel was tested and examined.

The only criticism that the committee has received came from an organization that was considering introducing the program but had heard that this project stimulates so much interest that more activity would be demanded in the schools and community than the available manpower could perform. In reality, this was a marvelous recommendation, as it indicates that certification of schools overcomes complacency in the public mind toward tuberculosis eradication. It will be unfortunate, however, if workers in the aforementioned area do not take advantage of this opportunity to use the increased interest stimulated by certification to procure adequate funds to meet the demand.

The educational opportunity in certifying schools is immense. The two- or three-month preliminary campaign results in the citizenry learning much about tuberculosis. This is intensified as the day of testing approaches, which becomes a red-letter day in the community. Parents are eager and watching for the results of the tests of their children. It is a well-established fact in pedagogy that the best time to convey information on any subject is when people are personally interested. Moreover, actual participation in a project is the best method of teaching. In the school certification project, therefore, every personnel member and at least 95 per cent of the students participate.

Where, for any good reason, it is not possible to test 95 per cent of the students, a Class B Certificate is available when 80 per cent or more are tested. This is in recognition of special effort with the hope that difficulties will be removed so such schools may later qualify for Class A Certificates. However, 100 per cent of personnel must be tested to qualify for a Class B Certificate.

INCOMPLETE PROGRAM DANGEROUS

An unfortunate practice has been in effect in some places, which consists of testing only children in certain grades. The logic of such a procedure is difficult to understand. It fails by more than 50 per cent to qualify as a good program. It is hard to believe that such an anomalous procedure could have been introduced because of additional work required for a first-class program. An experienced nurse or physician can administer 300 tuberculin tests per hour with ease. Thus, 1,000 persons can be tested in a forenoon of a single school day. If this unsatisfactory procedure is due to lack of funds, an effort should be made to procure whatever money is necessary by letting the citizenry of the community know. There is probably no place in this country where, if such a problem were placed before the citizens, adequate funds would not be forthcoming.

When the qualifications were being prepared for certification of schools, the committee considered all such procedures but decided they were inadequate.

Moreover, the committee has never approved relaxing requirements for an individual or a group of schools. For example, members of parent-teacher associations and nearly the entire community involved had difficulty at first in understanding why the failure of one personnel member to meet the qualifications should cause denial of certification of their school. The answer was that, in several instances, the person or persons who refused to be examined knew they had pulmonary tuberculosis. When examination was demanded by the community, the disease was found. One contagious case of chronic pulmonary tuberculosis can infect many others. Therefore, no school can be certified if just one personnel member refuses examination.

This is an especially good time to continue or start the school certification project, as H. R. Smith, long-time livestock commissioner in Chicago, is soon to publish a book dedicated to the farm youth of America. It is a history of the tuberculosis eradication campaign among the cattle of this country. Attention is called to the tuberculin test, which has been the sole diagnostic agent, and how official accreditation of counties which met the qualifications was so valuable. This took advantage of local pride, created interest, and provided information. It required a large sum of money, but the American citizenry responded when it was sufficiently informed of the importance of the program. In fact, members of the veterinary profession have done more tuberculin testing than any other group. Conse-

quently, they are better informed about all aspects of this test than others. Under the direction of the United States Bureau of Animal Industry (now Animal Disease Eradication Division), 387,803,473 tuberculin tests were administered to the cattle of the United States between 1917 and 1957. A total of 4,062,634 reacted. By the use of the tuberculin test, tuberculosis among the 95,000,000 cattle of the United States has been reduced to 0.156 per cent.

What is the tuberculosis situation in the schools of America today? This question can be answered quite definitely in only a few states where extensive tuberculin testing has been done. In the Dakotas, Iowa, and Minnesota, approximately 3 per cent of school children have been found to react to tuberculin. Among personnel members, the percentage is much higher but not as high as is generally believed. For example, in North Dakota, testing of 5,587 revealed that slightly more than 19 per cent of the personnel members reacted. In Iowa, in the school year 1955 and 1956, 2,789 personnel members were tested, and slightly more than 19 per cent reacted. In 1956 and 1957, only 15 per cent of the 2,173 tested were infected with tubercle bacilli. Among young personnel members, the incidence of infection is low, but among the older ones, it may run as high as 30 to 40 per cent. The older persons had almost no protection against either the human or bovine tubercle bacilli when they were children. Therefore, many are still carrying residual infection. The young personnel members were much better protected when they were children, hence the low incidence of present infection.

In New Hampshire, extensive testing of high school students revealed only 5 per cent reactors in 1956 against 60 per cent in 1916.

From 1949 to 1951, Palmer and associates tested more than 120,000 white men and women from 17 to 21 years of age. They included Navy recruits from all parts of the United States and students, mostly freshmen, attending colleges and universities in 17 states. Only 8.8 per cent reacted.

OUR RESPONSIBILITY

The American School Health Association must accept not only the privilege but also the responsibility for leading the tuberculosis eradication campaign in the schools of America. A well-established program has been developed by which this can be accomplished by working in close cooperation with all others concerned in the solution of this problem. If only 3 per cent of the 27,118,000 grade school children, 5 per

cent of the 12,854,000 high school students, and 20 per cent of the personnel react to tuberculin, there are now in the schools of this country 1,696,240 persons harboring tubercle bacilli. If only 1 per cent of the 16,000,000 preschool children are infected, 160,000 more children carrying tubercle bacilli will soon enter the schools. These are conservative numbers, but they indicate the magnitude of our problem.

Inasmuch as a tuberculin reaction means that at least microscopic lesions harbor tubercle bacilli and since clinical and contagious tuberculosis develop only in tuberculin reactors, the importance of finding children and personnel who are already infected in the schools is obvious.

Since tuberculosis often is a lifetime condition, tuberculin reactors of today must not only be examined promptly for gross clinical lesions but must also be on guard for the remainder of their lives. Therefore, they should not only be found while in school but should be appraised of future potentialities so they may act accordingly. With modern methods of detecting clinical tuberculosis in the presymptom and precontagious stage and with the present therapeutic armamentarium, there is little excuse for any of those infected today or those who subsequently become infected to fall ill or die from tuberculosis if they are properly informed and act accordingly. Moreover, if they are armed with this information on leaving school, they can contribute mightily in the tuberculosis eradication campaign in the communities where they subsequently reside.

In addition to the achievement that is now possible through tuberculosis work in the schools, each member of this organization can experience the greatest satisfaction that comes from helping children, as is expressed in the following: "He who helps a child helps humanity with an immediateness which no other help given to human creatures in any stage of their human life can give."

MUST FIND DISEASE WHEN LESIONS ARE MICROSCOPIC

In the past, the major part of time and effort has been devoted to seeking advanced cases and trying to repair the damage. Now we are seeking the disease just as soon as it can be found with the tuberculin test. This is causing considerable confusion in the minds of persons accustomed to thinking of tuberculosis only after it has caused illness, is contagious, or casts large x-ray shadows. All chronic pulmonary tuberculosis starts in a microscopic way when it causes no

symptom, casts no x-ray shadow, and is not contagious. In this stage, it can be found only with the tuberculin test. Everyone who reacts to this test has tuberculosis as surely as those who are sick from the disease.

Objections have been raised to testing in schools, because it has been said that so few cases are found, referring to advanced contagious tuberculosis. Advanced disease is a rarity among children except in the occasional high school student. Therefore, the school certification program is not aimed at finding advanced cases but rather at detecting those who have tuberculosis long before it has evolved to clinical proportions and apprising them of its potentialities as well as seeking the sources of their infection. However, the examinations required for certification also find those who may already have advanced and contagious disease, such as the occasional high school student and personnel member.

Where certification is instituted and perpetuated, contagious cases are found and removed from the community. Therefore, the number of infected children entering school will decrease from year to year.

JOINT EFFORT AROUSES CITIZENRY

The joint effort of the American School Health Association and State and Municipal Tuberculosis and Health Associations in certification of schools awakens practically everyone in the community to the seriousness of the remaining tuberculosis problem. When the project is in progress, the citizenry becomes so informed as to demand a total tuberculosis eradication program.

When certification is achieved, the Tuberculosis Association has the greatest opportunity in its entire existence to proceed toward the eradication goal. Inasmuch as the people whom it serves are better informed, are more interested, and are more eager to work than ever before, the association can then proceed with the follow-up work on all the tuberculin reactors found among the students and personnel of the schools. Enough previously unsuspected cases of contagious disease are detected to keep interest and activity at a high pitch. The program can then be extended with ease and rapidity to every segment of the population. On several occasions, certification of schools has led to adoption of county-wide tuberculin testing campaigns, with all of the indicated follow-up work.

A good example may be taken from the May 1957 report of Paul C. Williamson, executive director of the Iowa Tuberculosis and Health Association. At the end of two years of the certification project, he said:

1. "Twenty-two Iowa counties have conducted school certification tuberculin testing programs. Two of those counties conducted county-wide mass tuberculin testing programs for all age groups.

2. "Reactor registries are being established to guide the re-examination by x-ray film of all known reactors and converters.

3. "Physicians from the 22 county medical societies have participated actively in the program.

4. "The programs have involved over 100,000 families. This means that between 300,000 and 400,000 individuals have given personal attention to important facts about tuberculosis.

5. "Statistically, the information gathered thus far is of great importance for epidemiologic purposes and is forming a foundation for future tuberculosis control measures."

The 1957 report from Minnesota stated: "The certification program, with its appeal to school pride, has probably done more than any one thing to encourage all school employees to have regular check-ups for tuberculosis. This project has therefore been an aid in safeguarding children from possible infection by a tuberculous teacher, bus driver, or school cook.

"During 1956, in Minnesota, 132,000 school pupils and more than 10,000 teachers and school employees in 71 of the state's 87 counties participated in the 'Arms Against Tuberculosis' program. In 1957, of the 532 schools certified, 300 reported a 100 per cent response of pupils.

"Certification of schools is another excellent means for interesting pupils, parents, and the school personnel in the program to safeguard all against tuberculosis."

James J. Swomley, executive director, North Dakota Tuberculosis and Health Association said: "It is my belief that our school certification project has (1) given us a program of health education in the schools second to none, (2) given us an inexpensive case-finding method that is particularly valuable to areas of low tuberculosis incidence where other forms of case-finding may no longer be practical, and (3) improved our public relations by putting before the public a tangible program with popular appeal."

John Casebolt, executive director of the Montana Tuberculosis Association said: "In one small county in which we have been doing a pilot study, there is an enrollment of approximately 4,000 students. We were successful in getting the cooperation of every physician in the area, the use of 20 volunteer nurses, and an unlimited number of persons in the education field. I am

of the opinion that had it been needed in this small area, we could have called up 2,000 volunteers to assist in this program."

A SERIOUS PROBLEM WITH SOLUTION AT HAND

It has been estimated that in approximately 5 per cent of persons who react to tuberculin, clinical tuberculosis will at some time develop. This means that among students and personnel now in the schools of the United States, the disease will evolve to clinical proportions in 84,812 before completing their span of life. The estimate of a 5 per cent breakdown among tuberculin reactors is probably too low. A careful analysis by Bogen places it at 50 per cent.

The large number of persons now in the schools who are destined to break down with clinical tuberculosis can nearly all be prevented from becoming seriously incapacitated and disseminating tubercle bacilli to others. However, if they are not identified and if the careful observation required for this accomplishment is not done, their present infections can result in much illness, death, and spread of disease to others.

Clinical disease may be postponed to old age. In fact, most of the illness and death now occurring from tuberculosis in this country are among persons in the upper age brackets who, as infants and school children, had no protection against tubercle bacilli. Once infected they were not apprised of the dangers ahead. Thus, tremendous numbers of their generation have died, and they, the old survivors, are still paying a terrible price in health and life as the result of infections acquired early in life. Through the School Certification Project, provision has been made to protect present and future generations of children against such disaster.

The American School Health Association has done excellent work, but it has a tremendous task ahead to keep our school populations informed in order to exhibit the spirit of helpfulness referred to by Sir Walter Scott when he said, "The race of mankind would finish did they cease to help each other; all therefore that need aid have a right to ask it from their fellow mortals; none who hold the power of granting aid can refuse it without guilt."

ARDMORE DISEASE is an extremely infectious epidemic illness of the reticulo-endothelial system, characterized by upper respiratory symptoms, prolonged malaise, general adenopathy, painful hepatosplenomegaly, and a tendency to persist as a chronic, smoldering illness of several months' duration.

Although ardmore disease resembles infectious mononucleosis, heterophil agglutinations are negative and no atypical lymphocytes are found in the blood smear. Jaundice is almost never observed.

In an outbreak affecting 63 patients at Air Force bases in Ardmore, Oklahoma, and Lubbock, Texas, the most common complaint was severe pain in the lower chest or upper abdomen, which was increased by breathing or jarring. Scratchy sore throat usually preceded abdominal pain by a day or so. General myalgia, frontal headache of varying intensity, and nausea were common; vomiting was rare.

Patients usually appear acutely ill with sensitive posterior lymph nodes and extreme abdominal tenderness. The liver is palpable in 70 per cent on admission and in 92 per cent during hospitalization. Figures for immediate and eventual splenomegaly are 28 per cent and 48 per cent, respectively. One half of patients have some fever.

Laboratory studies are not diagnostic. Lymphocytes are sometimes increased. Liver function tests show much less derangement than the symptoms suggest. Cephalin-cholesterol flocculation is elevated in most cases, and Bromsulphalein retention is increased in three-fifths. Albumin-globulin ratio is occasionally reversed.

WILLIAM L. WILSON, M.D., Hahnemann Medical College, Philadelphia; CHARLES D. WILLIAMS, M.D., Charlotte, North Carolina; SAUL L. SANDERS, M.C., Ardmore Air Force Base, Ardmore, Oklahoma; and R. P. WARNER, M.D., New York City. Arch. Int. Med. 100:943-950, 1957.

Viruses and their Relationship to Cancer

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VIROLOGY AND ONCOLOGY are related in three broad areas of medical interest: oncogenesis, oncolysis, and intracellular chemistry and metabolism. These relationships have no immediate application in clinical medicine, but they carry implications for the understanding, prevention, and treatment of human cancer which demand the attention of research workers and practitioners alike. To orient this discussion, some general characteristics of viruses and virus infection will be briefly reviewed. The brief bibliography includes only selected studies and reviews in which the interested reader can find more detail and complete documentation.

CHARACTERISTICS OF VIRUSES AND VIRUS INFECTION

A virus may be defined as a submicroscopic obligate intracellular parasite. The word parasite indicates its status as a living organism and its reliance on its host for sustenance. Its obligate intracellular nature indicates its relative size and the fact that it has metabolic inadequacies at the level of intracellular metabolism. All viruses studied so far contain nucleic acid and protein. Some plant viruses, insect viruses, and bacterial viruses contain no other constituents. The protein forms a sheath around a core of nucleic acid. The nucleic acid of bacteriophage is deoxyribose nucleic acid (DNA), while that of the plant viruses is ribose nucleic acid (RNA). Animal viruses are more complex. They may contain lipids, carbohydrates, and enzymes. They may contain DNA or RNA or, possibly, both. Sketchy evidence suggests that viruses which propagate within the nucleus have DNA, and intracytoplasmic viruses have RNA. The inability to prepare animal viruses without contamination by host cell constituents has hampered chemical analyses.

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Since the intracellular state is obligatory for viral propagation, it follows that virus anabolism must utilize host cell constituents, and, since a virus has few if any enzymes of its own, it commandeers these nutrients at a relatively complex biosynthetic level. This loss of intracellular nutrients might be detrimental to the host cell, or the cell might not be noticeably affected if the demands of the virus are within the capacity of the cell to supply. A virus, however, does not merely accumulate host metabolites. It molds them into its own protoplasmic structure. Therefore, we can also conceive that a virus might synthesize metabolites which, if allowed to accumulate, would restrain host cell metabolism or propagation or, conversely, might goad the cell into greater activity. These various conditions are analogous to parasitism, commensalism, and symbiosis at a cellular level. If the virus-infected cell is part of the metazoan host, these conditions would be evidenced as tissue destruction, inapparent infection, or tissue proliferation, respectively.

The origin of viruses has been the subject of considerable philosophic speculation. One view is that viruses are degenerate microbes which have given up their birthright of independent life for the effortless life of parasitism and by a sort of Lamarckian evolution have lost those protoplasmic constituents which are superfluous in their protected environment. The opposite view holds that viruses originated from cell organelles which have acquired partial autonomy. In the present discussion, it matters little whether a virus is regarded as a beloved parasite or a rejected offspring.

Virus infection at the cellular level consists of several successive steps (figure 1). *Adsorption* is a reversible stage in which the virus becomes attached to the cell membrane. *Penetration* is an irreversible stage during which the virus penetrates into the cell. The entire virus particle does not necessarily penetrate into the cell. Studies of the T even phages of *Escherichia coli* suggest that the viral nucleic acid alone penetrates the cell wall and initiates infection. *Viral replication* may yield complete virus units or incomplete forms, which are not demonstrable by direct

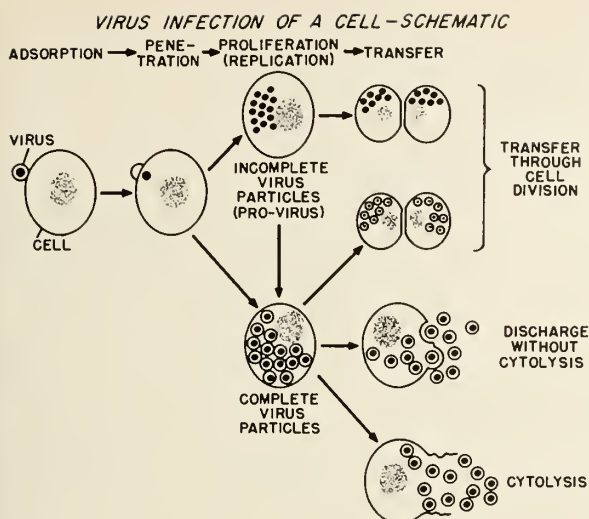


Fig. 1. Schematic representation of the stages of virus infection of a cell. The scheme is based largely on studies of bacteriophage, but sufficient data are available concerning animal and plant viruses to justify the assumption that at least most of the indicated steps and variables apply generally in virus infections.

isolation or serologic techniques. *Transfer* of virus into new cells may accompany cell division, with a parceling of virus particles into both daughter cells, or may follow release of virus particles into extracellular fluids. Release commonly involves destruction of the cell (cytolysis) but can also occur without cell damage by such mechanisms as accomplish disposal of cell waste (reverse pinocytosis). When the virus becomes extracellular, the cycle of cellular infection starts again.

At the host level, virus infection must also be considered in several steps. *Inoculation* is that process by which the virus is introduced into or onto the multicellular host. *Incubation* is the time during which the process of intracellular infection and transfer is occurring but before the host manifests any infection. The *systemic phase* of infection is that period when virus is widely disseminated throughout the host by distribution through body fluids. A systemic phase may not occur in all viral infections but is more frequent than previously suspected. *Viremia* is the presence of virus in the blood and, so, is often synchronous with the systemic phase of infection. *Tropism* is the phenomenon of selective distribution of viruses to particular tissues. Examples of dermatotropic, hepatotropic, and neurotropic viruses are well known. The characteristic manifestation of a virus infection is usually a reflection of specific tropism, but tropism does not inevitably result in damage at the site of localization. *Disease* is that condition of host malfunction

which results from tissue damage (destruction or proliferation) by the virus and the reactions of the host to the virus infection. Virus infection can occur without producing disease. In fact, inapparent virus infections are much more frequent than virus-induced disease. *Antibody formation* is a host response to the presence of the virus, and the appearance of circulating antibodies is roughly coincident with the disappearance of virus from the extracellular fluids. Virus may persist and propagate within cells even in the presence of circulating antibodies, which are generally incapable of penetrating the cell membrane. Such intracellular virus may cause no apparent ill effect at the cellular or host level. It may cause chronic disease. At any time, changes may occur in the virus or host which upset the delicate balance of inapparent infection and cause delayed pathology. This would be interpreted, in clinical terms, as an exacerbation of disease or, if the infection had previously been inapparent, as primary disease following a long incubation period. Pathogenic virus infection may be followed by a period of repair which constitutes the major part of the "clinical" picture.

Thus, the patterns of virus infections may be overt or inapparent; acute, chronic, or latent; and destructive or proliferative. The patterns may vary not only according to the species of pathogen and host but also in different individuals and at different times in the same individual. Possible patterns of virus infections are diagrammed in figure 2.

Transmission of a virus from host to host may be horizontal or vertical. *Horizontal transmission* includes those routes with which we are most familiar—droplets, fomites, arthropods, and so forth. *Vertical transmission* denotes passage from parent directly to offspring during ontogeny. It is recognized in the transmission of *Rickettsia* through successive generations of their arthropod host and in infections with Bittner's milk factor and is postulated for Gross's leukemia virus of AK strain mice.

Adaptation, although probably a property of all protoplasm, is particularly evident in viruses. Under suitable conditions, a virus may change in its ability to localize or cause pathology in various types of cells or tissues or may even change in its infectivity for various hosts. Although little is known about the mechanics of viral adaptation, it might be postulated that this involves a change in the genetic material (nucleoprotein) of the virus due to the change in the source materials from which it is derived. Genetic changes induced by the accessibility of dif-

PATTERNS OF VIRUS INFECTIONS

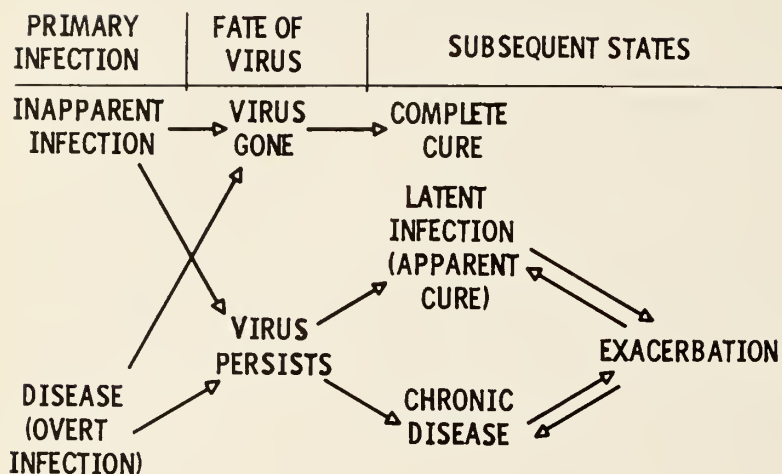


Fig. 2. Patterns of virus infections in a metazoan host. All indicated possibilities are well-established in either natural or experimental virus infections of man and mice.

ferent DNA (transformation or recombination) have been repeatedly observed in bacterial cells and in some bacteriophage systems.

VIRUSES AS ONCOGENIC AGENTS

The most basic fact in any consideration of viruses as causes of cancer is that some viruses do cause neoplasms. The list has continuously enlarged since the reports of Ellerman and Bang in 1908 and Rous in 1911 that leukemias and sarcomas of chickens are caused by filterable viruses. A list of virus-caused neoplasms is presented in table 1. More than 10 examples of virus-induced tumors are firmly established by repeated critical investigations of the viral nature of the causative agent and malignant neoplastic nature of the pathologic lesion. Many more examples have been reported and are listed in the table as "probable" because published data present less convincing information on the malignancy of the tumor or the viral nature of the inducing agent or because confirmatory reports from other laboratories are still lacking. The list is impressive not only for the number of virus-induced tumors but for the wide range of animal species represented. The list is also remarkable for the absence of man.

Although no virus which is oncogenic for man has ever been recognized, two phenomena deserve mention as possibly related conditions. Viruses which stimulate nonmalignant cellular proliferation in man are well known. Verruca vulgaris and molluscum contagiosum are benign neoplasms of viral origin. The early lesions of herpes zoster, varicella, trachoma, and certain other dermatotropic viruses are characterized by cellular proliferation. The leukemoid reaction which occasionally accompanies virus infections,

such as mumps, is also a cellular hyperplasia caused by virus, although it is not known whether the effect on hematopoiesis is indirect or due to actual virus infection of hematopoietic tissues.

On the basis of what is already known about oncogenic viruses of animals, it is clear that the relationship between host and virus in an oncogenic virus infection differs in many respects from infection by such viruses as equine encephalitis or influenza, which we are accustomed to consider as typical viruses.

Oncogenic virus transmission may be by routes which are now considered unusual. For example, Gross's leukemia virus of AK mice apparently has a vertical transmission from mother to offspring. Bittner's virus is transmitted through the mother's milk to the infant mice and, in addition, can apparently be transmitted through spermatozoa.

A long incubation period is characteristic of some virus-induced tumors. Gross's leukemia virus and Bittner's virus (milk factor) both have incubation periods of about one year, which is probably longer than the average life span of wild mice. Such long incubation periods imply that the virus exists intracellularly for a long time without causing overt pathology. It suggests that, under natural conditions, there may be an extremely high incidence of inapparent infection and that the development of overt disease may necessitate coincidental stresses. The role of secondary etiologic factors is recognized in certain virus infections of man. Recurrent herpes simplex is characteristically activated by an upper respiratory infection or mechanical trauma. The tendency for paralytic poliomyelitis to occur in an extremity which has been traumatized during the early phase of infection is quite well doc-

TABLE 1
PARTIAL LIST OF VIRUS-CAUSED TUMORS

<i>Animal</i>	<i>Tumor</i>	<i>Discoverer</i>	<i>Virus designation and remarks</i>
<i>Generally accepted group</i>			
<i>Viral and neoplastic characteristics conclusively established</i>			
Chicken	Lymphomatosis	Ellerman?	A complex of many virus strains with obscure interrelationships
Chicken	Erythromyeloblastosis	Ellerman & Bang }	
Chicken	Sarcoma I	Rous	Rous sarcoma virus
Rabbit	Papilloma to carcinoma	Shope	Papillomas often proceed to carcinomas
Mouse	Breast cancer	Bittner	Bittner's milk factor
Mouse	Leukemia	Gross	In newborn AK mice only
Mouse	Leukemia	Friend	Transmissible in adult mice
Mouse	Leukemia	Graffi	
<i>Probable group</i>			
<i>Viral and neoplastic nature not fully established</i>			
Fruit fly	Melanosis	Burton & Friedman	?Neoplastic growth
Pike, perch, etc.	Lymphocystic disease	Weissenberg	
Pickerel frog	Renal tumor	Lucké	
Frog	Lipoma	Thomas	Usually a benign tumor
Rabbit	Myxoma	Sanarelli }	Neoplastic or inflammatory? Viruses are closely related serologically
Rabbit	Fibroma	Shope }	
Squirrel	Fibroma	Kilham et al.	
Deer	Fibroma	Shope	

umented. Similarly, it has been shown that intravenous administration of Shope papilloma virus or Rous sarcoma virus causes tumors at sites of mechanical or chemical irritation. Genetic and hormonal factors are also of great importance in determining host response to virus infections.

It may be difficult to demonstrate the presence of an oncogenic virus in tumor tissue. This may be due to unsuitable test systems, but even when suitable technics are available, it may be impossible to detect a virus in such thoroughly studied tumors as Shope papilloma and Rous sarcoma. This apparent periodic disappearance of the virus has given rise to the concept of a "masked" virus, which is assumed to be an incomplete virus particle analagous to the prophage of the bacterial viruses. It is conceivable that viruses actually are not present in some virus-induced tumors and that the neoplasm is a continuing reaction to an etiologic agent which has since disappeared. Such a hypothetical situation has its parallel in the glial nodules of post-encephalytic parkinsonism or the cirrhosis and nodular regeneration which may follow infectious hepatitis.

The phenomenon of virus adaptation has been demonstrated in oncogenic viruses, particularly

with the Rous sarcoma virus which has been adapted to growth in several species of fowl other than chicken. Evidence of recombination has been presented for two oncogenic viruses. It has been reported that Lucké's kidney tumor virus of frogs, after passage through salamanders, caused muscle tumors instead of kidney tumors on subsequent reinoculation into frogs. A mixture of DNA from killed myxoma virus with live fibrosarcoma virus caused myxomas when reinoculated into rabbits. The possibility of adaptation and recombination in oncogenic viruses could theoretically give rise to an almost infinite variety of viruses and tumors.

A problem which must be faced if we are to consider the possibility of virus-induced cancer in man is the apparent lack of antigenicity of spontaneous cancer, because virus infections with which we are now acquainted, including some oncogenic virus infections, are followed by the production of serum antibodies. However, this obvious problem is probably not real. First, it is not necessarily true that spontaneous cancer is not antigenic. Nonantigenicity is generally assumed because of clinical familiarity with progressive human cancer. It can be postulated, but never proved, that cancer does not develop in

many persons exposed to oncogenic agents because they developed adequate specific immunity, while only in the exceptional individual is the agent able to produce overt disease. The presence of specific immunity can neither be proved nor disproved until an immunologic test system is available, and this requires specific antigens. Even if a circulating antibody is present, it cannot destroy a virus which remains intracellular (transferred through cell division). Even if it is true that cancer produces no circulating antibodies, it does not follow that cancer is nonantigenic, since antibodies are usually undetectable in the presence of antigen excess—the state one would expect in the patient with uncured cancer—and circulating antibodies are often not demonstrable even in situations of known specific immunity, such as allergic states. Second, even if spontaneous cancer is truly nonantigenic, the presence of a virus cannot be excluded because the virus may be antigenically compatible with the host. Extensive studies with Bittner's milk factor and with Rous sarcoma virus suggest that this situation exists when these viruses are in their natural hosts. Third, since oncogenic viruses may enter their hosts during fetal life, they may be nonantigenic by virtue of acquired tolerance, as has been demonstrated for tissue antigens by Billingham and Medewar and co-workers.

In trying to assess without prejudice the possible importance of viruses in human oncogenesis, it must be recognized that cancer is not one disease but many. It is no exaggeration to say that the diseases which we lump together under the term cancer are as diverse in their manifestations and course as are the infectious diseases. Quite conceivably, each of these neoplastic diseases is a separate etiologic entity. There may be no simple etiology for neoplastic diseases, but an interplay of several etiologic factors may act in concert. Finally, it must be recognized that failure to isolate a virus is no proof of the nonexistence of a virus.

In summary, it may be said that although there is no proof that viruses have an etiologic relationship to human cancer, neither is our present knowledge of cancer or of viruses inconsistent with the hypothesis that viruses may be responsible in whole or in part for some or even all cancer in man.

VIRUSES AS ONCOLYTIC AGENTS

Interest in the capacity of viruses to destroy tumor tissue had its inception in clinical observations of "spontaneous" tumor regression in man following coincidental virus infections. De-

Pace, in 1912, observed regression of cervical carcinoma in a woman who had Pasteur treatment for rabies after a dog bite. Hoster observed a remission of Hodgkin's disease in a patient with infectious hepatitis. Regression of a facial melanoma in a patient given rabies vaccine was observed by Pack and associates. Several other examples of transient tumor regression temporally related to various virus infections have also been reported. These observations prompted the deliberate induction of similar virus infections in other patients with cancer. However, the resulting tumor regressions, if any, were insufficient to stimulate continued work.

In the laboratory, Levaditi, Nicolau, and others observed as early as 1922 that vaccinia and herpes simplex viruses grew well in several tumors of mice, but the work of Moore was the first concerted attempt to study viral oncolysis in experimental animals. The contributions of many other workers to this field have been outlined in Moore's recent review.

Many viruses, notably, Russian encephalitis, West Nile, Ilheus, Mengo, Bwamba, Semliki, and Bunyamwera have shown impressive oncolytic activity against some types of experimental animal tumors. Oncolysis is accompanied, without exception, by high concentrations of virus in tumor tissue, even though the virus is inoculated at sites distant from the tumor. When used to treat tumors of mice, these viruses usually cause death. The oncolytic effect, however, is unrelated to the severity of illness because if a virus-resistant host is used—an animal which is infected but not killed by the virus—tumor inhibition can be produced without ill effect on the host. Conversely, many lethal viruses have no antitumor effect. Curative results with virus treatment of tumors have been demonstrated with sarcoma 180 in a virus-resistant strain of mice treated with Russian encephalitis virus, in myxoma and fibroma of rabbits treated with Semliki forest virus, and in lymphomatosis of chickens treated with a variety of arthropod-borne viruses.

The ability of viruses to inhibit various tumors forms a spectrum which is unpredictable on the basis of virus type or tumor type by any presently known criteria. The effects are, however, consistently reproducible, even to the extent that the tumor-inhibiting characteristics of a virus against a spectrum of tumors might be utilized to identify a virus.

By serial passage of viruses in a single type of tumor, it has been possible to increase the oncolytic capacity of a virus for a given type of tumor and even to produce an adapted strain of a high-

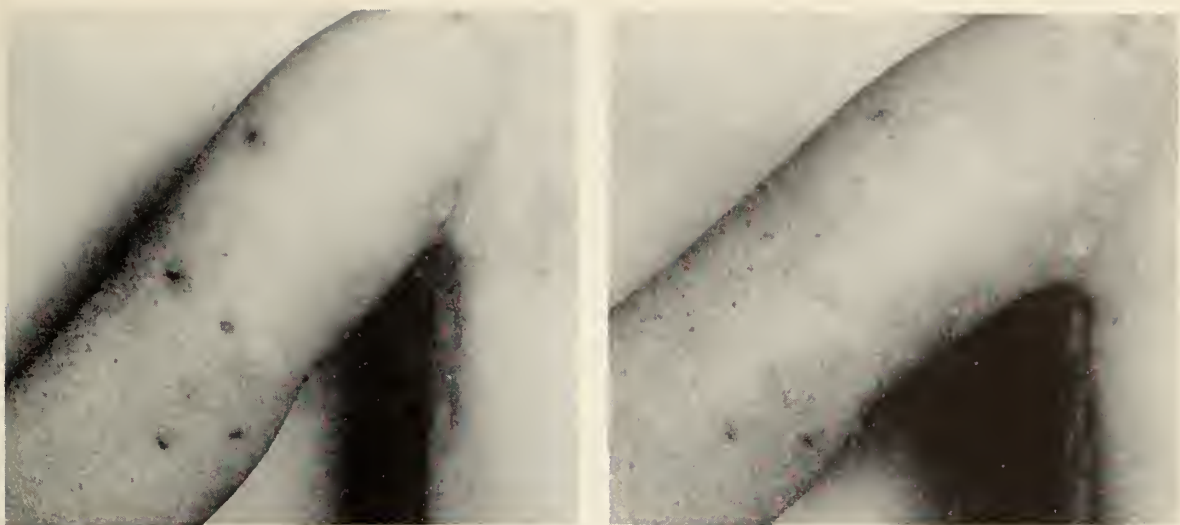


Fig. 3. Regression of skin metastases of lymphangiosarcoma due to West Nile (Egypt 101) virus infection. (*Left*). Papular lesions on arm nineteen days after virus administration. Regression was already apparent by this time, but no comparable view was photographed prior to treatment. (*Right*). Further regression three and one-half months after virus. Virus was demonstrated in tumor biopsies taken on the eighth day.

ly oncolytic virus for a tumor which was originally unaffected by that virus.

The demonstration of viral oncolysis in animal tumors stimulated interest in studies with human cancer. The development of technics for the laboratory cultivation of human cancer in conditioned animals and in tissue cultures permitted such studies at the laboratory level. Moore and co-workers have demonstrated destruction of human cancer cells by viruses of various types in tissue culture, in embryonated eggs, and in cortisone-treated rats and hamsters. As with the experimental tumors of mice, these results form a reproducible spectrum that is unrelated to cell type or viral characteristics. The effect of viruses on a given cancer cell in one system is paralleled by the effects observed in other systems using the same cell line. These studies have, however, been hampered by the many variables involved in these systems and by the extreme susceptibility of the experimental animals in which human cancer cells are grown to viruses. Attempts to increase oncolysis by serial passages in human cancer cells in tissue culture have been disappointing to date. However, Heubner and co-workers have reported impressive adaptation of several adenoviruses and Coxsackie viruses against He-La cells by serial passage using cortisonized rats as the tumor-bearing host.

In the discouraging problem of treating incurable human cancer, it was logical to attempt to use for therapeutic purposes the oncolytic capacity of viruses of low pathogenicity. A

therapeutic trial of several such viruses was initiated in 1950 at Memorial Cancer Center. Tumor regression which could be objectively evaluated has occasionally been observed, but the oncolytic effect has seldom been sufficient to substantially benefit the patients. The most impressive result of these studies, aside from the unprecedented opportunity for virologic and serologic studies on pedigreed virus infections in man, was the demonstration of a high frequency of oncotropism, with or without oncolysis, and the fact that many viruses could be administered to human beings with minimal or no evidence of disease resulting from the virus infection. Somewhat similar studies using the adenoviruses were initiated in 1954 at the National Cancer Institute in patients with advanced cancer of the cervix. Here, too, results provided evidence that these viruses possess a tumor destructive capacity, but effects were seldom of therapeutic importance.

The most impressive tumor inhibiting effects so far in the studies at Memorial Cancer Center have been with the Egypt 101 isolate of West Nile virus against neoplasms of the reticulo-endothelial system. Several patients with adenocarcinoma of the large bowel have also shown slight response, but, in general, there are insufficient data to state that any one category of cancer is most susceptible to the viruses which have been tested to date. Recently, a patient with lymphangiosarcoma experienced almost complete but temporary tumor regression after Egypt 101 virus infection (figure 3).

TABLE 2
PARTIAL LIST OF AGENTS WITH BOTH ANTIVIRAL AND ANTITUMOR ACTIVITY^a

Chemical category	Antiviral activity			Antitumor activity		
	Plant viruses	Bacterio- phages	Animal viruses	Man	Mouse	Other
<i>Purines:</i>						
Amino substituted purines		+	+	±	+	
8-aza purines	+	O	O	O	+	+
<i>Pyrimidines:</i>						
Diazo pyrimidines	+				+	
5 halogenated pyrimidines	O	+	+	±	+	
Phenoxythio pyrimidines			+		+	
<i>Folic acid antagonists:</i>						
Chlorophenyl pyrimidines		+	+	±	+	
Benzimidazoles	O	+	+	O	+	+
4-amino folic acids		+	O	+	+	+
<i>Other vitamin analogues:</i>						
Sulfonamides		+			+	
Pyridoxine analogues	O	+	+	O	+	
<i>Amino acids:</i>						
Methionine analogues		+	+	O	+	+
<i>Thiosemicarbasones:</i>			+		+	
<i>Antibiotics:</i>						
Netropsin		+	+		+	
Fumagillin			+		+	

^aStatements of antiviral and antitumor activity are based on *in vivo* tests, but criteria for evaluation vary widely in different systems. Published statements of activity have been accepted uncritically and are gleaned principally from the reviews cited in bibliography. If any activity is reported, the agent is tabulated as +. If negative tests are reported, the designation is O. No entry means no data known by the author. A ± designation is used for human tumors only, to indicate suggestive or minimal antitumor activity, because a more critical evaluation seemed desirable in man.

The possibility that viruses may be found or produced which will cause truly worthwhile regression of human cancers cannot be disregarded. The results in experimental animals have been so impressive and the occasional tumor regressions in patients have been so tantalizing that the study certainly merits continued investigation. Attempts to adapt viruses in the direction of greater oncolytic capacity and lessened pathogenicity is a hopeful area for continued study, although the possibility must be recognized that each patient's cancer cells are so individualized that adaptation might be effective only for a single cell type. Basic research in this area may have even greater importance than the immediate clinical application, since it seems clear that selective oncotropism is a demonstration of the difference between normal and cancer cells in some property at the intracellular level. Probably, as studies on cellular and viral metabolism continue, differences between normal and neoplastic cells will be pinpointed which can be exploited by more conventional means of cancer chemotherapy. The possibility that this type of study will also furnish leads in the field of antiviral chemotherapy should not be overlooked.

OTHER RELATIONSHIPS BETWEEN VIRUSES AND CANCER

The thesis that the cancer cell differs essentially from its normal counterpart because of differences in cellular metabolism and the fact that viruses enter into or partake of intracellular metabolic processes in reproducing themselves implies a similarity between virus-infected cells and cancer cells in that both are similar to but, nevertheless, differ significantly from the normal cell. The study of the metabolic processes of viruses and the effect of various metabolites and antimetabolites upon virus propagation thus have potential carry-over to the understanding of and selective interference with the metabolism of the cancer cell. Therefore, the problem of cancer chemotherapy would seem to be closely paralleled by antiviral chemotherapy. This suspected relationship is further emphasized by the fact that several antimetabolic compounds which interfere with nucleic acid synthesis demonstrate both antineoplastic and antiviral activity. Table 2 lists several examples.

An interesting parallel between virus infections and neoplasms is that both are essentially intracellular pathologic processes without pri-

mary extracellular abnormality. It follows that even if a specific antibody is formed or passively administered, it would have no effect upon either process as long as the abnormal materials remained intracellular.

There are superficial similarities between neoplastic and viral diseases which suggest the existence of natural resistance against both types of disease. The variable course of cancer in different individuals might be interpreted as either fluctuation in the aggressiveness of the cancer cell or as fluctuation of host resistance. The variation in cancer incidence at various ages suggests the possibility that host resistance to certain types of cancer varies with age, although alternative explanations are equally attractive. In parallel with these variations in neoplastic diseases are well-known variations in resistance to virus diseases. Baby chickens are extremely susceptible to infection with numerous viruses of the arthropod-borne group but rarely succumb to these infections. After the age of 3 or 4 weeks, however, chickens rapidly become completely resistant (not a specific immunity) to these same viruses. Conversely, lymphocytic choriomeningitis virus propagates well in the brains of suckling mice but causes no apparent disease, although, in adult mice, it is rapidly fatal. The reverse phenomenon is equally well known in the Cocksackie group of viruses, which are lethal

for suckling mice but cause no pathology in adult mice. An equally great variability in response to a given virus is found in individuals within the same age group. This is most dramatically apparent in man, for example, in poliovirus or Japanese B encephalitis infections, people exposed to presumably equal inocula of virus may show no infection, infection without clinical illness, illness with complete recovery, persistent pathology, or death may ensue.

These apparent similarities between viral infections and cancer may not be susceptible to direct investigative comparison, but they point up the importance of basic research in all fields because of the possibility that advances in any branch of science may have eventual application to problems of immediate importance to man.

CONCLUSION

Finally, oncology and virology have many characteristics and problems in common which are of great research interest, and, although these problems may now be principally of academic interest, we may hope and expect that research in these two fields will lead to findings of clinical importance.

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General Principles for Drug Therapy in Childhood Epilepsy

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THE FOLLOWING GENERAL PRINCIPLES for drug therapy in childhood epilepsy are based on the follow-up studies of approximately 9,000 children with epileptic seizures of all types. All of these children have been observed for ten to twenty years.

1. *Treatment should be instituted as soon as the diagnosis has been established.* This is the most important aspect of the treatment of epilepsy because, in most cases, the degree of success in the control of seizures bears a direct relationship to the duration of the epilepsy. The longer the epilepsy has continued, the less likely it is that a satisfactory result will be obtained, regardless of the type of therapy instituted. In addition, it is important to prevent a recurrence of seizures, particularly those of long duration, because such seizures can produce irreversible brain damage.

The pediatrician is frequently called on to answer the following questions:

- a. Is a single convulsion of undetermined etiology of sufficient evidence to make a diagnosis of epilepsy?
- b. Should a patient who has had only one convulsion of undetermined etiology be given prolonged therapy with anticonvulsant drugs in the same manner as a patient who has had many seizures?
- c. Is much lost if treatment is delayed until the patient has another seizure?

Our answers to these questions are as follows. A patient who suffers with a seizure and in whom a specific cause, such as hypoglycemia, hypocalcemia, fever, and so forth, cannot be determined should be regarded as having epilepsy unless repeated examinations and the passage of time prove it to be a manifestation of some other disorder. This is true whether the electroencephalogram is normal or abnormal.

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We believe that much is to be gained, in most instances, by immediately instituting prolonged therapy in patients who have had only one epileptic seizure. Certainly, seizures are much less apt to recur if the patient receives prolonged therapy with anticonvulsant drugs.

The adverse emotional effect of a recurrence of seizures is also an important factor which should be considered. In the very young child, this is really not of consequence as far as the patient is concerned, but it is extremely important in the case of the older child. It is always important to the parents, and we believe that it outweighs the adverse emotional effect of daily medication in an apparently healthy child.

The attitudes of the parents must be considered very seriously. Let us suppose that we see a 5-year-old child who has had a major motor epileptic seizure. The public today is very "epilepsy minded," and the parents will undoubtedly ask about the possibility of subsequent seizures. The physician must tell the parents that there is a chance that their child will experience a recurrence of seizures. If the parents are told to go home and return for treatment only if their child has another seizure, they will obviously be under great emotional stress. Many of our parents who were given such instructions kept their children under constant surveillance for years thereafter. On the other hand, if the patient is treated immediately after the initial convulsion and the parents are told that the chances that seizures will recur are much less if the child continues to take the medication regularly for a prolonged period of time, both the parents and the patient soon return to a normal life.

2. *Selection of the drug of first choice for the treatment of any case of epilepsy depends upon the type of seizure.* Some anticonvulsants are more effective in controlling certain types of seizures. On the other hand, some drugs often increase the frequency of some types of convulsions.

For example, phenobarbital and Dilantin are particularly effective in the control of major motor seizures but frequently accentuate petit

TABLE 1
DRUGS CURRENTLY IN USE FOR
CONTROL OF DIFFERENT TYPES OF EPILEPTIC SEIZURES ARRANGED
IN ORDER OF OUR PREFERENCE.
BASED ON RELATIVE EFFECTIVENESS, TOXICITY, AND COST

<i>Major motor</i>	<i>Petit mal</i>	<i>Minor motor</i>	<i>Psychomotor</i>
Phenobarbital° (or Mebaral)	Benzedrine (or Dexedrine) sulfate	Phenobarbital° (or Mebaral)	Dilantin
Dilantin	Paradione	Miltown (Equanil)	Phenobarbital (or Mebaral)
Mysoline	Tridione	Bromides	Benzedrine (or Dexedrine) sulfate
Bromides	Dimedione°°	Benzedrine (or Dexedrine) sulfate	Mysoline
Peganone	Celontin	Celontin	Peganone
Gemonil	Diamox	Milontin	Celontin
Mesantoin	Milontin	Gemonil	Phenurone
	Miltown (Equanil)		Tridione
	Atabrine		Mesantoin
	Prenderol		

°Mebaral is given to patients who manifest untoward reactions to phenobarbital.

°°At the time of this writing, Dimedione could be purchased only from Leo Pharmaceutical Products, Lovens Kemiske Fabrik, Brons-kojvej, Copenhagen, Denmark.

mal spells. Tridione, on the other hand, is an effective agent for petit mal spells but sometimes precipitates major motor seizures or increases the frequency of pre-existing major motor epilepsy.

Many drugs are now being used to treat the various types of epileptic seizures. The drug of first choice for any given case should be selected on the basis of relative effectiveness, toxicity, and cost of the drug (table 1).

3. *Treatment should begin with one drug. Others should be prescribed only after it has been determined that the maximum tolerated dosage of the starting drug failed to produce a satisfactory clinical response.*

In patients who suffer relatively infrequent seizures, the conventional starting dosage should be prescribed initially. The dosage of this drug should be increased, if necessary, until a satisfactory control of seizures is attained or until the limit of tolerance has been reached. In some instances, a second drug may be necessary, but it should not be prescribed until after it has been determined that the maximum tolerated dosage of the first drug failed to produce a satisfactory clinical response. If the maximum tolerated dosage of the first drug fails to control the seizures satisfactorily but does reduce the frequency or severity of the seizures to some extent, it should be continued at the same dosage along with the

second drug, and the dosage of the second drug should be increased, as needed, to tolerance. However, if the maximum tolerated dosage of the first drug fails to help the patient in any manner, it should be gradually withdrawn simultaneously with the administration of the second drug. Occasionally, it may be necessary to prescribe the maximum tolerated dosage of more than two drugs in order to obtain a good control of seizures.

In patients who experience relatively frequent and severe seizures, the average maximum dosage should be prescribed initially. This dosage should be decreased or increased, if necessary, depending upon the patient's tolerance and the frequency of seizures. Other drugs should be added to the therapeutic regimen, if required, in the same manner as heretofore mentioned.

The medication should be taken daily. It should be given at times that do not interfere with the patient's routine activities, such as with meals and at bedtime. In most instances, it is advisable to prescribe the total dosage in equal divided amounts throughout the day.

4. *The therapeutic dosage of anticonvulsant medication varies between patients.* The proper dosage for any given patient is that which controls his seizures without producing untoward reactions which interfere with his general well-

being. Dosage should not be increased to the point where the patient is so dull that he is more incapacitated by the administration of the drug than by the attacks themselves.

The goal in the treatment of epilepsy is to attain a complete control of seizures. The drug dosage necessary for complete control may, in some patients, produce unpleasant reactions, such as drowsiness, which are more of a handicap than the seizures themselves. Some patients may be better off leading a normal life between occasional spells than living free of seizures in a perpetual state of drug-induced drowsiness and confusion. In instances of pronounced drowsiness, it is advisable to administer daily dosages of stimulating drugs, such as amphetamine sulfate, before reducing the drug dosage below the level which controls seizures.

5. *The medication should be taken daily, at the same dosage which controlled the seizures, for at least four years after the time of the last convulsion.* If the four-year period of freedom from seizures should coincide with the onset of puberty, the medication should be continued throughout the adolescent period. This is particularly important in girls.

6. *The medication should be discontinued very gradually.* Following the four-year-period of freedom from seizures, dosage should be reduced gradually over a period of one to two years. It is important to note that a sudden withdrawal of anticonvulsant drugs, especially phenobarbital, frequently causes recurrence of seizures or status epilepticus. Dosage should be increased immediately to the original level if attacks should recur during the period of reduction.

7. *Periodic physical and laboratory examinations should be made on all patients receiving certain drugs.* Complete blood counts should be made on all patients receiving such drugs as Mesantoin, Tridione, and Paradione, which are known to have an adverse effect on the hematopoietic system. These should be made before the institution of therapy and at least at monthly intervals thereafter. If no abnormalities occur within twelve months, the interval between counts may be extended. It is our policy to discontinue the use of the drug in patients in whom the total white count drops below 3,500 or in

whom the percentage of neutrophils is markedly reduced or whose platelet count drops below 125,000. The drug may be readministered when the blood count returns to normal. In such cases, however, blood counts should be made twice a week for a month or so thereafter. The parents or the patient should be instructed to report immediately any sign or symptom of possible damage to the hematopoietic system, such as fever, sore throat, easy bruising, bleeding gums, petechiae, ecchymosis, epistaxis, or vaginal bleeding.

Periodic urine examinations should be made on patients receiving drugs which are known to have had an adverse effect on the genitourinary system, such as Tridione and Paradione.

Liver function tests should be performed on patients receiving Phenurone before the institution of therapy and at regular intervals thereafter. The parents or the patient should be advised to report immediately to the physician the appearance of jaundice, dark urine, general malaise, fever, gastrointestinal upset, or any other disturbance which may be indicative of a beginning hepatitis. Phenurone should be employed with caution in any individual with a history of previous liver damage.

A drug should be discontinued immediately at the first appearance of any type of cutaneous reaction. It is important that the patient be protected with some other type of drug when this is done, as sudden withdrawal of a drug may precipitate a recurrence of seizures or status epilepticus. The same dosage of the drug may be prescribed again to patients with the milder types of rashes, such as the morbilliform, scarlatiniform or urticarial rashes, but only after the rash has completely disappeared. It is inadvisable to continue use of the drug in patients in whom purpuric rashes, exfoliative dermatitis, or other serious skin reactions appear. The occurrence of the rash for the second time is also a contraindication for the continued use of the drug.

The data presented in this discussion were taken in part from *The Diagnosis and Treatment of Convulsive Disorders in Children* by Samuel Livingston. Springfield, Illinois: Charles C Thomas, 1954.

Drug Synergism in the Management of Arthritides

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IT IS A WELL-KNOWN and generally accepted observation that the concurrent administration of two or more therapeutically related drugs may be attended by a better clinical response than can frequently be secured by either agent when used alone in equivalent dosage. For many generations, this principle was the basis of the physician's prescription, and, although a considerable degree of empiricism was then involved, today, in numerous instances, the rationale of drug combinations can be definitely established by objective pharmacologic studies. As a rule, two drugs of qualitatively identical or closely similar actions produce effects which are purely additive in character. On the other hand, two drugs may cause similar physiologic responses, although producing their action through entirely different channels and on systems which are even diametrically opposed in their functions. Under these circumstances, the combined effect is not necessarily additive but may follow a logarithmic curve to which the term "potentiation" is frequently applied.

The present study is concerned with the clinical use of two popular and very frequently prescribed antiarthritic preparations—Pabalate-Sodium Free and Pabalate-HC. The principal ingredients of each of these preparations possess antiarthritic and antirheumatic properties, and a good deal is known not only of the site and mode of action of each compound but also the manner in which one may augment or modify the other for greater therapeutic efficiency and with fewer undesirable side reactions.

For more than seventy-five years, salicylates have been used for the treatment of arthritis and other rheumatic disorders, and, although a considerable measure of symptomatic relief could be attributed to analgesia, the degree of therapeutic response could not be explained by this

property alone. The salicylates have other important actions, which have been brought to light only within recent years. Because of the necessity of giving comparatively large doses in order to obtain a satisfactory clinical response, the incidence of undesirable effects is high and symptoms of salicylism occur quite frequently when aspirin or plain sodium salicylate are used. Little evidence, however, suggests that these toxic effects are related to the principal action of salicylates which renders the drugs effective in the treatment of rheumatic disorders. It seems quite significant that mild Cushing's syndrome was reported by British investigators¹ to have occurred during intensive salicylate therapy, indicating that the adrenal cortex had been stimulated to overactivity or, at least, that the effect of salicylates closely resembled the steroid hormones of the adrenal cortex. A year later, van Cauwenberge and Heusghem,² of the University of Liege, observed a pronounced increase in urinary reducing steroids after salicylate therapy, but the 17-ketosteroid values were variable. These observations have been confirmed by other authors.³ The studies of Done and associates,⁴ of the University of Utah, are particularly interesting in showing a marked elevation of plasma 17-hydroxycorticosteroid in nonrheumatic fever patients and in guinea pigs following salicylic intoxication. In the presence of active rheumatic fever, however, these investigators⁵ were unable to demonstrate a consistent effect of salicylates upon plasma corticoid levels, although greater fluctuations in values were encountered than were usually found as a diurnal variant in untreated patients.

It has come to be generally recognized that the antiarthritic and antirheumatic action of salicylates is mediated through the pituitary-adrenal axis, producing effects which are practically indistinguishable from those resulting from ACTH or from hydrocortisone. Albanese and co-workers⁶ have called attention to some important nutritional characteristics of salicylates when used in the treatment of children with active

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rheumatic fever. Their observations indicate that the adrenal corticotropic action of salicylates, as evidenced to some investigators by alterations in the count of circulating eosinophils, does not cause catabolic effects on the vitamin C or nitrogen stores of the human body.

A second component of the Pabalate formulation is para-aminobenzoic acid which is available either as the sodium or potassium salt. This compound plays a very important role in metabolism as the prosthetic moiety of certain enzyme systems and is considered a member of the B-complex vitamins. Aside from this nutritional or metabolic effect, para-aminobenzoic acid exhibits a pronounced antirheumatic action principally in the rheumatoid type of arthritis, although the initial analgesic effect is less than that produced by aspirin or sodium salicylate. It seems quite logical that a combination of salicylates and para-aminobenzoates, as represented in Pabalate, should provide the additive therapeutic effect of both drugs, although the quantities of each ingredient would be below the toxic threshold and, therefore, the combination would occasion fewer adverse side reactions. For all practical purposes, this would amount to an increase in the therapeutic index for the combination, as contrasted with that for the ingredients administered separately and in therapeutically effective dosage. Because of the favorable responses of some collagen diseases to para-aminobenzoic acid and, also, the inhibitory action of the drug on hepatic inactivation of estrogens, Wiesel and co-workers⁷⁻⁹ investigated the effects of concurrent administration of para-aminobenzoic acid and cortisone in rheumatoid arthritis. Their observations indicate a definite synergistic effect and that the combined use of these compounds permitted effective control of the clinical manifestations of rheumatoid arthritis with much smaller cortisone dosage. Using liver tissue from rats as well as from human beings, Wiesel¹⁰ was able to confirm by *in vitro* studies the original concept that para-aminobenzoic acid interferes markedly with the rapid reduction of unstable conjugated systems of the cortisone molecule while permitting more rapid degradation of the side chain. A similar hepatic competitive action has been demonstrated for salicylates toward the inactivation of alpha-estradiol by retarding ketosteroid conversion, and, presumably, this would apply to other steroid hormones, including those of the adrenal cortex.

What seems, therefore, to be a very plausible explanation for the synergistic effect of salicylates and para-aminobenzoates as related to the adrenal corticosteroids is that these drugs are not

only competitive in the liver toward their mutual conjugation and inactivation, but they jointly compete with the 17-hydroxycorticosteroids in the hepatic inactivation processes.

On more or less empirical grounds, Dry and associates,¹¹ of the Mayo Clinic, were led to administer para-aminobenzoates and salicylates concurrently in the treatment of rheumatic fever and obtained such a dramatic response that further studies on the mechanism of this synergism were made. Determinations of plasma salicylate levels indicated to these investigators that the two compounds appeared to exert a reciprocal effect in increasing their concentration in the blood stream when given together orally. It was suggested that competitive renal clearance might be a factor in producing these elevated plasma values.

Although ascorbic acid is contained in the Pabalate formulation to the extent of 50 mg. per tablet, the role which this vitamin plays in the physiology of adrenal cortex is not clearly understood. The adrenal cortices seem to store ascorbic acid in exceptional quantities as compared with other tissues, and the amount present is often taken as a guide to the functional capacity of the gland. Apparently, man and some animals are unable to synthesize the vitamin from their diets and must, therefore, depend upon receiving the vitamin from exogenous sources. Notwithstanding the apparent lack of clinical correlation between arthritis and scurvy, it has been suggested that the vitamin may play some role in the synthesis of the adrenocortical hormones. Depletion of the stores of ascorbic acid may result from intensive salicylate therapy,^{12,13} stress, or the use of pituitary adrenocorticotrophic hormone or cortisone and similarly acting steroids. Pollak and Halperin¹⁴ and Schroeder¹⁵ feel that vitamin C stores should be maintained when cortisone or ACTH is given.

The therapeutic effectiveness of Pabalate in the treatment of rheumatic diseases and the relative freedom from undesirable side reactions have been reported by several authors.^{16,17} Smith¹⁸ has shown that the pain relieving quality of the combination was superior to sodium salicylate in patients suffering from arthritis and fibrositis and that the relief lasted longer. Unpleasant side reactions were not observed with the combination, whereas toxic manifestations were exhibited by 69, or 55.2 per cent, of 125 patients receiving sodium salicylate alone. The degree of analgesia was, however, somewhat less pronounced in the osteoarthritic group than in the rheumatoid type. In a study of the effect of certain antiarthritic drugs, O'Connell and associ-

ates¹⁹ reported that the combination of paraaminobenzoic acid and salicylic acid (Pabalate) caused a significant increase in the eosinophil response to ACTH, whereas neither sodium paraaminobenzoate nor sodium salicylate alone in a daily dosage of 60 to 90 mg. per kilogram of body weight altered this eosinophil response.

CLINICAL MATERIAL AND METHODS

Because of the many individual variables encountered when attempting to evaluate arthritic therapy in ambulatory patients, this study was limited to a series of 60 patients who were hospitalized and under continuous medical supervision. Environmental and dietary factors, physical therapy, and other considerations were reasonably uniform, although the nature and severity of the symptoms and the duration of the disease varied widely. Thirty-five of the patients were classified as having the degenerative form of arthritis, such as osteoarthritis, senescent or hypertrophic arthritis, or arthritis deformans. About half of the remainder were classified as exhibiting some form of degenerative arthritis, and the rest were definitely placed in the rheumatoid category. A complete record was maintained for each patient from the time of admission until discharge from the hospital. Detailed information about the date and nature of the onset of the disease, estimations of the severity of pain and discomfort, limitation of motion, deformities, edema, and pain in joints or muscles after rest and activity were carefully recorded. Numerous periodic fluctuations in the severity of symptoms made an accurate evaluation of the results quite difficult or impossible. In order, however, to create some practical degree of uniformity in the evaluation of antiarthritic agents, the New York Rheumatism Association, in 1949,²⁰ proposed a system of classification of arthritic patients which could be conveniently utilized as a guide in evaluating the progress of treatment without resorting to laboratory tests or elaborate objective measures. This system has been followed in reporting the results of this investigation.

On admission to the hospital, the patient was subjected to a thorough physical examination to determine the nature and degree of disability. Quantitative evaluation of the range of motion was recorded by means of a goniometer, and a dynamometer was used to estimate strength of muscles of the forearm, wrist, and hands. These tests were repeated at frequent intervals. In addition, routine roentgenograms of the chest, spine, and affected joints were made, and electrocardiographic studies were conducted whenever

cardiac involvement was suspected. Blood and urine specimens were obtained at frequent intervals for the usual chemical and histologic examinations, and erythrocyte sedimentation rate determinations were made every two or three weeks during the period of hospitalization.

The basic and palliative treatment of the patients, regardless of rheumatic classification, consisted of the usual dietary measures with additional vitamins or tonics when necessary. A low-salt diet was prescribed for those who were obese or when there was evidence of edema, sodium retention, or cardiovascular renal disease. Many of the patients received physiotherapy as an important part of their treatment five days of each week, depending upon individual needs. Drug therapy in all cases consisted of Pabalate-Sodium Free or Pabalate-HC (same formulation but with the addition of 2.5 mg. of hydrocortisone). The latter preparation was restricted for use in the more severely afflicted rheumatoid patients when the disease was not complicated by peptic ulcer, pulmonary tuberculosis, diabetes mellitus, psychoses, or other conditions which enjoined caution in the use of adrenocorticosteroids or ACTH. The usual dosage of Pabalate-Sodium Free consisted of 4 tablets administered 4 times daily, although it was felt that many patients could have been effectively treated with a much lower dosage. The initial dose of Pabalate-HC was 2 tablets given 3 times daily and gradually increased as necessary to gain a satisfactory remission of symptoms. After this response, the dosage was gradually reduced to avoid rebound effects, which are often reported when the dosage of cortisone or hydrocortisone is too rapidly reduced. The results observed in the treatment of the 60 cases of arthritis based upon relief of symptoms and restoration of functional capacity are summarized in table 1.

Of considerable interest was the observation that the clinical response to the drug combination therapy was very closely related to the duration of the disease. This correlation is shown in table 2.

As a matter of convenience, the 60 patients comprising this study were classified as having (1) rheumatoid arthritis or (2) degenerative joint disease, and it seems quite important to consider the efficacy of treatment for each group as a separate entity. The great majority of the rheumatoid arthritic patients showed considerable diminution of stiffness, easing of joint pain, and a distinct feeling of well-being, usually within four to five days after starting therapy. The most dramatic results were observed in patients who had had arthritis for a short time. Joint

TABLE 1
EFFECT OF PABALATE THERAPY UPON CLASSIFICATION OF ARTHRITIC PATIENTS
ACCORDING TO FUNCTIONAL CAPACITY

Class	Functional basis	Number of patients in each class		Remarks
		On admission	At discharge	
I	Mild: Ability to carry on usual duties without discomfort.	6	24	18 patients showed superior improvement to enter Class I.
II	Moderate: Ability to perform duties despite discomfort or limited motion in one or more joints.	33	26	15 remaining Class II patients and 11 transferred from Class III.
III	Severe: Activity limited to few, if any, of the duties of occupation or self-care.	18	7	7 patients failed to show sufficient improvement for reclassification.
IV	Incapacitated: Bedridden or confined to wheelchair; little or no self-care.	3	3	Disease too far advanced to show appreciable improvement.

TABLE 2
EFFECT OF DURATION OF ARTHRITIS UPON PERIOD OF HOSPITALIZATION AND TREATMENT

Duration of disease	Number of patients	Per cent of series	Period of treatment	Number of patients	Per cent of series
1 to 5 yr.	4	6.5%	to 3 mo.	16	26.0%
5 to 10 yr.	20	34.0%	3 to 6 mo.	21	35.0%
10 to 20 yr.	24	40.0%	6 mo. to 1 yr.	19	32.5%
Over 20 yr.	12	19.5%	Over 1 yr.	4	6.5%

changes, such as tenderness and swelling, pain, and limited motion, were invariably followed by diminished arthralgia and increased range of motion, as indicated by lack of unusual discomfort as well as by goniometric readings. In the degenerative, or osteoarthritic, group of patients, which comprised approximately 50 per cent of the series, Pabalate was given in doses sufficient to produce a satisfactory degree of analgesia without causing undesirable side reactions. There was no evidence of nausea, tinnitus, or other signs of salicylism. Blood salicylate levels were not determined because the wide range of values reported by different investigators made it difficult to correlate the plasma levels of salicylates with the degree of clinical response. Also, there is little reason to assume that the maximum degree of relief is chronologically coincident with the peak plasma salicylic level. In many cases, the medication could have been reduced after obtaining the desired relief of symptoms, but patients were advised to continue treatment at home or to increase the dosage if severe symptoms and pain recurred. On two separate occasions covering one week each, aspirin in equivalent dosage was substituted for Pabalate, with

the result that the majority of patients complained of increased joint pain and, frequently, of ringing in the ears and gastric upsets. While there is little doubt as to the analgesic efficacy of acetylsalicylic acid, particularly in acute episodes of pain where temporarily high salicylate levels are desired, evidence seems to indicate that the concurrent administration of para-aminobenzoic and salicylic acid produces a more uniformly sustained level for prolonged analgesia and, therefore, is superior to aspirin in the treatment of chronic rheumatic disorders.

CONCLUSIONS

1. Combinations of para-aminobenzoic and salicylic acid, as the potassium salts, with ascorbic acid (Pabalate-Sodium Free) exhibit a pronounced antirheumatic effect in the majority of patients with degenerative joint diseases, as manifested by decreased pain and by increased range of motion of the affected joints.

2. This combination of drugs is of special value in rheumatoid arthritis when treatment is established before the occurrence of fibrous or bony ankylosis. In severe rheumatoid arthritis, the same formulation with the addition of hydro-

cortisone (Pabalate-HC) is often dramatically effective with few undesirable side effects.

3. The observations reported in this clinical study are confirmatory of the synergistic relation-

ship between salicylates, para-aminobenzoates, and the adrenal corticoids.

4. Clinical results are most favorable in arthritis of recent origin.

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UNILATERAL NUMBNESS AND WEAKNESS, especially of the face, tongue, arm, or leg, may precede the pain of migraine rather than visual aura. Hemiplegic migraine is probably caused by spasm of the branches of the internal carotid artery. Two types can be distinguished.

Minor hemiplegic migraine occurs on either side and the paresthesia disappears after the pain begins. The common visual aura may also occur at times in the same patient. Other family members probably have migraine, though not necessarily the same kind.

Major hemiplegic migraine often occurs exclusively on one side. The aura is prolonged and either persists or increases after onset of pain. The cerebral disturbance is evidently more widespread, as confusion, drowsiness, coma, or bilateral motor signs are noted. These patients seldom have any other type of migraine. Usually, the same kind of attack has appeared in several members of the family for two or three generations.

Tumor or cerebral angioma must be considered in the differential diagnosis of migraine headache, especially the hemiplegic type, when attacks are exclusively unilateral. If physical findings are inconclusive, carotid arteriography may be necessary.

R. T. Ross, M.D., Winnipeg. *Canad. M.A.J.* 78:10-16, 1958.

The Mechanism of Parathyroid Function

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TO BEGIN, it is important to review briefly parathyroid function as it was pictured in the late forties and early fifties. Based on the pioneering work of Collip, MacCallum, and Vögtlin, the principal effects of parathyroid secretions were well-established. In excess, these secretions cause hypercalcemia, hypophosphatemia, increased phosphate excretion, and a characteristic fibrotic change in the bones. This change, osteitis fibrosa, is suggestive of a very active erosion and remineralization. If the hypercalcemia has been chronic in nature, renal dysfunction and renal calcifications are frequently seen.

In the absence of the parathyroid glands, pretty much the opposite picture is observed. A low-serum calcium and a high-serum phosphate are characteristic. The bones appear dense and highly mineralized. The classical, clinical picture is, of course, a convulsive tetany presumably caused by the low-serum calcium.

This rather confusing, though simple set of variations, was first explained in an over-all concept by Dr. Fuller Albright and was elaborated in detail in his now classical book written in collaboration with Dr. Edward Reifstein, "Parathyroid Glands and Metabolic Bone Disease." According to their view, parathyroid hormone first induced a large outpouring of phosphate in the urine through a direct renal action. On the presumption that the serum is approximately saturated with bone mineral and that any fall in the calcium phosphorus product of serum causes the bone mineral to dissolve, this outpouring of phosphate in the urine results in a dissolution of bone mineral with a transfer of calcium and phosphorus to the blood. Because the mobilized calcium does not go out in the urine, it accumulates in the serum. According to this view, the over-all parathyroid effect is thus a renal action followed by a more or less passive response in bone.

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Unfortunately for the Albright concept, two sets of experiments have been reported which conclusively show the bone action of the hormone is a direct and important event. Barnicot, in England,¹ and Chang,² in Chicago, have transplanted bits of parathyroid tissue to bone. Immediately adjacent to these grafts, the bone has been observed to resorb. Other transplanted tissues do not bring about this resorption. Also important was the work of Stewart and Bowen,³ Talmage and associates,⁴ and Monahan and Freeman,⁵ who were able to demonstrate a full hypercalcemic effect in animals whose kidneys had been removed. Clearly, then, the action on bone is a primary one.

Let us not presume, however, that Dr. Albright was unaware of the rather fragile experimental basis on which his over-all scheme had been built. In the very beginning of his book, he spends many pages attempting to determine whether serum is saturated or undersaturated with respect to bone mineral. He kept reaching such conclusions as the following: "Unfortunately, both these calculations leave the serum very much supersaturated which is unlikely." And again: "However, if one calculates the solubility products from the calcium and inorganic phosphorus of spinal fluids, one still comes out with supersaturation." He refers to the blood-bone equilibrium in the following terms: "In spite of the fact that the chemists and the physicists have not come to a final conclusion as to what equilibrium is involved, for the clinician, the important inference is that the body fluids are either saturated or at a constant degree of supersaturation or undersaturation in respect to some salt of calcium and phosphate, so that in the absence of any fluctuation in the pH, a rise in the calcium ion will lead to a fall in the phosphate ion and vice versa."

Such an uncertain situation may be good enough for the clinician in some cases, but it is not adequate for the biochemist, particularly if he wants to *build* on the concept. The reason, of course, that Albright could not draw from the chemists a final conclusion regarding solubilities is that arguments were still being waged in the literature concerning the nature of the bone salt itself, and these arguments con-

tinued into the early fifties. Just as important was the fact that two schools of "solubility thought" were well represented — one school holding that serum was highly supersaturated and the other claiming that the serum was highly undersaturated — while a middle group found it difficult to believe that serum could be in anything but a moment to moment equilibrium with bone, and, therefore, was just saturated with bone mineral. As we shall see, all groups were correct; serum is both supersaturated, saturated, and undersaturated all at the same time.

The present story begins, then, with experiments attempting to establish the nature of the solid phase and its solubility. A number of reports appeared in the literature suggesting what the bone salt might be. For many years, it had been recognized that much of the bone mineral exhibits the lattice structure, as shown by x-ray diffraction, characteristic of hydroxy apatite. But, early suggestions of *mixtures* of salts kept attracting new supporters. For example, in the early fifties, Dallemagne and Cartier⁶ in Belgium, considered bone mineral to be a *mixture* of calcium carbonate and magnesium carbonate and "a-tricalcium phosphate." Secondary calcium phosphate, CaHPO_4 , has also been prominently mentioned as a component salt.

Now, physical chemistry tells us that crystalline salt dissolves unless the solution with which it is in contact is just saturated. Can serum be *just saturated* with respect to *several* salts simultaneously? Such a coincidence seems highly improbable. To resolve these questions, we must consider the actual, effective concentration or activity of calcium, of phosphate, and of carbonate in normal human serum. This will permit us to calculate solubility products accurately. Then we will know whether there is *inheritance* to these suggestions of mixtures.

The distribution of calcium in normal serum is given in table 1. These are recent calculations⁷ using activity coefficients and the latest ultrafiltration data of Toribara and associates.⁸ As the table clearly shows, approximately 65 per cent of the calcium is freely diffusible, and 35 per cent is bound to protein. Of the freely diffusible part, only a small fraction is bound in the form of complexes. These are the citrate complex, the bicarbonate complex, and the phosphate complex. The net result is: the effective concentration of calcium ion, in terms of activities, is about 0.5×10^{-3} . It is interesting that these calculations are in excellent agreement with the early, classical work of McLean and Hastings.⁹ Recently, Howard's laboratory, using a biologic end point, also came to this same figure¹⁰ of

1.3 mm. ionic calcium — an activity of 0.5×10^{-3} .

Phosphate, as far as we now know, is all free and diffusible, and we have only to distinguish between its various ionic forms. There is practically no tertiary phosphate ion in serum. For our interest, secondary phosphate is the important ion and, as seen in table 2, the effective concentration — the activity — of secondary phosphate ion is about 0.2×10^{-3} . This figure multiplied by the calcium activity determined previously gives us a product of $\text{Ca}^{++} \times \text{HPO}_4^{=}$ of 1×10^{-7} in normal adult human serum. We shall use this expression abbreviated to $\text{Ca} \times \text{P}$ throughout our discussion. Experience has shown that this simple ion product is the best measure of saturation of both serum and of inorganic solutions in the region of near neutrality.¹¹

Now, we must dispose of the suggestions of the various mixtures of salts. Using the thermodynamic concentrations, one can calculate that serum is undersaturated with respect to calcium carbonate. Such a material cannot form. If it formed, it would dissolve. Similar calculations can be made for magnesium carbonate and secondary calcium phosphate. Serum is less than half saturated with respect to these salts. There is further, more definitive evidence against the occurrence of CaHPO_4 . Data from the literature given in figure 1 illustrate what happens to secondary calcium phosphate at physiologic pH. Secondary calcium phosphate has a theoretic mol ratio, calcium to phosphorus, of 1. As the

TABLE 1
DISTRIBUTION OF IONIC FORMS OF CALCIUM IN SERUM

Calcium fraction	mM.
Total	2.50
Protein-bound	.82
Soluble Complexes	.30
Ionic*	1.33

*Expressed as ion activity,
 $[(1.33 \times 10^{-3}) \times 0.36]$ or 0.5×10^{-4} .

TABLE 2
DISTRIBUTION OF IONIC FORMS OF INORGANIC PHOSPHATE IN SERUM

Ionic fraction	mM.
Total	1
H_2PO_4^-	0.19
$\text{HPO}_4^{=}$	0.81*
$\text{PO}_4^{=}$	8×10^{-5}

*Expressed as ion activity,
 $[(81 \times 10^{-4}) \times 0.23]$ or 2×10^{-4} .

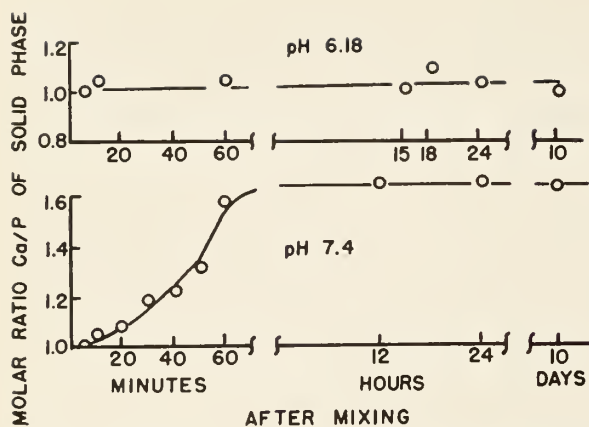


Fig. 1. Spontaneous conversion of secondary calcium phosphate ($\text{Ca/P}=1$) to hydroxy apatite ($\text{Ca/P}=1.66$) at physiologic pH. Taken from.¹¹

figure shows, on standing, this material, though it forms initially, is unstable and hydrolyzes spontaneously to give the theoretic ratio of hydroxy apatite a mol ratio of 1.6. This chemical finding was confirmed by an x-ray diffraction analysis of the solid phase. Having discovered for ourselves this remarkable event, we subsequently found that very early work by Shear and Kramer¹² had already demonstrated the instability of secondary calcium phosphate under physiologic conditions. Some time later, Hodge also demonstrated¹³ that, above pH 6.2, hydroxy apatite is the only stable form. We may conclude, then, that bone mineral is not a mixture of salts but, rather, represents a single mineral phase—that of hydroxy apatite: $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$.

Hydroxy apatite is derived from the Greek term meaning "to deceive." This it has done for many, many years. It is a miserable material for study. The crystals are always very, very tiny, of colloidal size, and present a tremendous surface area of 100 to 200 square meters per gram. Most substances in a macrocrystalline state do not permit substitution of their constituent ions because any lattice is a very rigorous-space-charge structure. At the crystal surface, however, these requirements of space and charge are much less rigorous. Because many of the ions in hydroxy apatite salt reside in surface positions, a wide variety of ion substitutions can occur, and the composition of hydroxy apatite mirrors the composition of its fluid environment.⁷ If the environment contains sodium, so does the solid phase. If it contains carbonate, so does the solid phase, and so on. As a result of this extensive ion-exchange process, we find

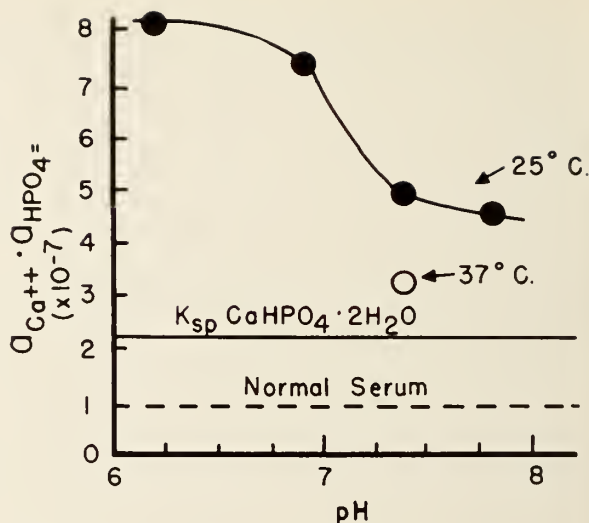


Fig. 2. Point of spontaneous precipitation of calcium phosphate as function of pH. Each point was determined by mixing a series of solutions of graded contents of calcium and phosphate to find the minimum product ($\text{Ca} \times \text{P}$) which would cause precipitation in a ten-day period of observation. Taken from.¹¹

that bone mineral is not a pure hydroxy apatite by any means. Rather, it contains many of the ions found in the extracellular fluids: sodium, carbonate, citrate, magnesium, and traces of fluoride. We know from well-established physico-chemical theory that a substance which exhibits variable composition cannot exhibit a fixed solubility. If the surface composition varies, the escaping tendencies of the ions must vary. Therefore, *the solubility of bone mineral and of hydroxy apatite preparations cannot be defined except in terms of the solution and the solid involved in the equilibrium.*

In the absence of a solid phase, hydroxy apatite itself cannot form directly. This would involve a collision of 16 to 18 ions all of the correct energies. On a statistical basis, this is impossible. We find, therefore, the only salt which can form directly in solutions is secondary calcium phosphate. This involves a collision of only 2 ions. As a result, the stability of solutions in the absence of a solid phase is governed by the solubility product of secondary calcium phosphate and, under most circumstances, some degree of supersaturation is required to initiate precipitation. These data¹¹ are illustrated in figure 2. Here we see that precipitation occurs only at activity products higher than 3, and normal serum is only one-third of this precipitation value. Therefore, we can conclude that, in the absence of a solid phase, serum is highly undersaturated.

TABLE 3
SUMMARY OF SOLUBILITY INFORMATION

	$10^7(a_{\text{Ca}^{++}} \cdot a_{\text{HPO}_4})$
Required for precipitation	2 to 5
Given on dissolution	0.001 to 0.5
Observed in serum	0.5 to 2

However, in the presence of a solid phase, at physiologic pH, hydroxy apatite is the only stable solid phase, and, further, all investigators agree that hydroxy apatite has never dissolved to give products equal to those found in normal serum. We can conclude that in the presence of a solid phase, serum is normally supersaturated. This same conclusion was reached very recently by Dr. Nordin, an Englishman, working at Columbia.¹⁴ The summary of this situation is illustrated in table 3, where we see that the product required for precipitation is between 2 and 5. That given on the dissolution of apatite is quite variable but never exceeds 0.5 under physiologic conditions as defined by serum. Yet, we observe products in nature ranging from .5 to 2, human serum averaging 1. So, serum is both supersaturated and undersaturated, depending on whether or not a solid phase is present.

But, *in the animal*, a solid phase is always present! We can, therefore, presume that some kind of a discrepancy exists. Serum cannot correspond to fluid which is in contact with bone mineral. This may seem confusing, but the explanation is really quite simple. This is illustrated in figure 3.¹⁵ A given product of $\text{Ca} \times \text{P}$ can be supersaturated, saturated, or undersaturated, depending on the concentrations of the different ions in the surrounding fluid. Here, for example, the solubility curve is shown as it varies with the citrate concentration. With low concentrations of citrate, the bone mineral is quite insoluble, but at high concentrations of citrate, it is quite soluble. As seen in figure 4, a fixed $\text{Ca} \times \text{P}$, such as that of normal serum, can be supersaturated at the citrate concentration of serum. But, if bone fluids were to have a higher citrate concentration, this same $\text{Ca} \times \text{P}$ product could be in equilibrium. We might substitute on the abscissa pH for citrate. At low pH, bone mineral is much more soluble than it is at high pH. If, locally, the pH in bone were low, then the product $\text{Ca} \times \text{P}$ seen in normal serum would be perfectly reasonable as an equilibrium value. We must, then, presume that the composition of fluid bathing the mineral crystals is different

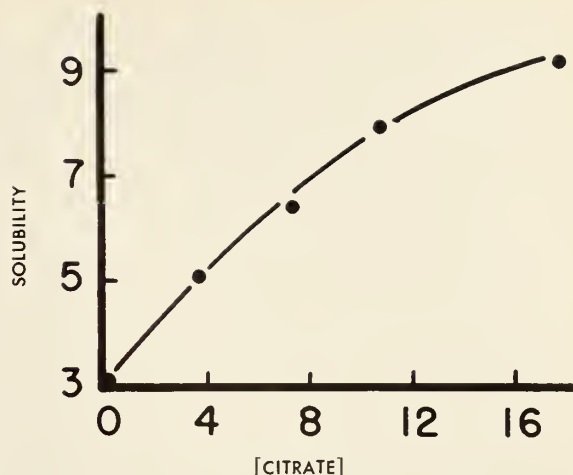


Fig. 3. Effect of citrate ion on solubility of bone salt (hydroxy apatite) at pH 7.4, $\mu = 0.16$. Solubility is expressed as the thermodynamic product, $a_{\text{Ca}^{++}} \cdot a_{\text{HPO}_4}$, multiplied by 10^{-7} ; thus, the range is from 3×10^{-7} to 9×10^{-7} . Taken from.⁷

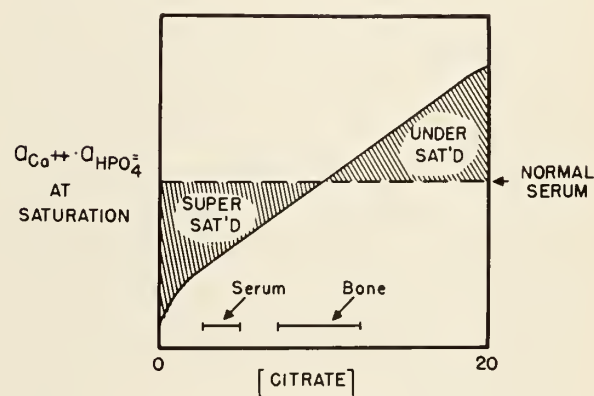


Fig. 4. Relation between the degree of serum's saturation with respect to bone mineral and its content of citrate ion. See text for explanation. Taken from.⁷

from that of normal serum. It is either higher in citrate, lower in pH, or different in some other ion-concentration. This brings us to our major postulate of cellularly induced ion-gradients. If the bone cells maintain a special composition of the bone fluid, that is, a pH lower than that found in serum or a citrate concentration higher than serum, we have resolved our solubility dilemma.

Let us digress for a moment to examine the theoretic basis at a molecular level for the phenomenon of a "medium-determined solubility."

The following is the three-step derivation for the solubility product, or K_{sp} :



by convention, the activity of any pure solid is considered constant and equal to unity. Since $a_{\overline{MA}}$ is constant, $a_{MA} = K$. (B)

But MA dissociates thus:



from which mass law gives us:

$$3. K = a_{M^+} \cdot a_{A^-} / a_{MA} \text{ or combining (B) and (C), } K^1 = K_{sp} = a_{M^+} \cdot a_{A^-}$$

From this derivation, it is easily seen that solubility product principle holds only if the activity of the solid phase is constant.

Turning now to exchange systems, the physical chemist has found that mass law again provides a useful derivation:

For the reaction, $Na^+ + HR \rightarrow NaR + H^+$ where R represents the resin or exchanger, we may write

$$K = \frac{a_{Na^+} \cdot a_{HR}}{a_{H^+} \cdot a_{NaR}} = \frac{a_{Na^+}}{a_{H^+}} \cdot \frac{\text{mol fraction HR}}{\text{mol fraction NaR}}$$

However, it has been found experimentally that this relation breaks down if more than a few per cent of the hydrogen positions have been displaced by sodium ions. When all hydrogens are surrounded by other hydrogens, the escaping tendency is a fixed quantity. As sodium ions begin to substitute randomly, the escaping tendency of the *remaining* hydrogens is altered.

From this experience, it is easily seen that *the activity of a solid is a constant only if relatively unsubstituted.*

Bone mineral is a highly substituted exchanger, and its activity is, therefore, not a constant and it cannot exhibit a K_{sp} .

The following steps of logic are:

1. Solubility depends on the activity of the solid phase.

2. The activity of a solid exchanger depends upon its degree of substitution.

3. The degree of substitution of a solid exchanger depends upon the composition of the medium.

4. Therefore, solubility of a solid exchanger depends upon the composition of the medium.

Since bone mineral, when added to serum, causes a precipitation, it follows that the fluid bathing bone must differ in its composition from serum.

We have already stated that the crystal surface permits ion substitutions not possible in the lattice interior. Armstrong and Singer¹⁶ have shown in an elegant fashion that citrate ions enter the solid phase by replacing surface phosphate groups. As a result of this displacement, the "citrated" surface exhibits a greater tendency to lose its constituent ions, and the activity of the solid phase is increased. We have obtained similar results with other ions. Carbonate, for example, displaces phosphate groups¹⁷ and increases solubility.¹⁸ Hydrogen ions displace calcium ions from the surface, and this too increases the activity of the solid phase—its solubility. This is an effect on the *solid phase*, a change in thermodynamic properties of the crystal surface. It is not chelation of calcium by citrate, or is it a change in the ionization of phosphate by hydrogen ion.

This resolution of the solubility dilemma is the *heart* of the present story and, perhaps, warrants a restatement in slightly different terms. We know from well-established results that the K_{sp} of secondary calcium phosphate represents a ceiling, the limit to the stability or solubility of any aqueous calcium phosphate system. We know too that the $Ca \times P$ given on dissolution of hydroxy apatite preparations can be almost anything, depending on the composition of the fluid, here represented as X and signifying a number of ions, carbonate citrate, pH and so forth.

Turning now to the situation in the animal, we find that serum, naturally enough, is well below the point of spontaneous precipitation, and, because of the rapid interchange of ions between the circulation and the bones, it seems only reasonable that the product $Ca \times P$ is the same in bone as it is in the circulation.

The conditions in serum, again represented by X, will not support such a high product if the solid phase is present. Serum is supersaturated, and this fact has been repeatedly shown by many people.

What we *propose* is that local conditions, X, in bone differ from those found in serum. The pH is lower, the citrate concentration higher, or some such local difference is the reason the solid phase supports such a high $Ca \times P$ in serum.

Going back to the older views, those who attempted precipitation experiments found blood to be undersaturated. They were correct! Those who performed dissolution experiments with the solid phase under blood conditions found blood to be supersaturated. They too were correct! Finally, those who reasoned that there could

hardly exist large concentration differences in calcium and phosphate between bone fluids and other extracellular fluids and that the bone and blood were in an equilibrium were probably also correct, but the equilibrium must be regarded as dynamic and under cellular control.

We have been forced, then, to conclude that the bone cells produce local high concentrations of some surface active ion, such as hydrogen or citrate. The question was: How can this postulated phenomenon be demonstrated?

We decided that to demonstrate pH in bone accurately enough to satisfy ourselves and others would be a problem fraught with technical difficulty. We, therefore, attempted to find whether a gradient in citrate ion exists, whether the bone cells maintain the crystals in an environment rich in citrate.

We considered the problem of demonstrating a gradient as essentially a problem in arterio-venous differences. If there were a large citrate gradient between bone and blood, the venous flow from the bone should be high in citrate, higher than the arterial supply.

Unfortunately, no convenient veins are derived exclusively from the bone circulation which can be cannulated. We, therefore, compromised and merely drilled a small hole into the spongiosa of the femur of the dog. This hole was cannulated with small polyethylene tubing and the dog, having been given anticoagulants, produced a nice flow of blood from the hole in the spongiosa. Obviously, the blood which was obtained from the hole was derived, in part, from arterioles, in part, from venules coming from bone and, in part, from venules collecting the circulation derived from marrow. In order to determine how much venous blood from bone was contributing to the collected sample, strontium⁸⁹ was administered to the animal. Sr⁸⁹ goes exclusively to bone and is, for practical purposes, completely cleared from the blood in a single pass. Therefore, the difference between the arterial level of Sr⁸⁹ and the Sr⁸⁹ level in the first collected blood gave an approximate percentage of the sample which was derived from the venous outflow of bone. A typical set of data are given in figure 5, which show the difference between the arterial level of strontium and the level of strontium in the blood derived from the hole. In this instance, there were two different holes, one drilled directly into the marrow cavity and one into the spongiosa. As expected, the blood from marrow had a smaller contribution from bone areas than did that derived from the spongiosa. Interestingly enough, the citrate content of these various

specimens followed the same pattern, that is, the sample having the largest venous contribution from bone had the highest citrate level — higher than the arterial supply.

We have studied the citrate levels in a great many dogs. In experiments on 9 normal animals, the average arterial citrate level was 3-mg. per cent and that observed in the collected samples from the hole in the bone was 3.5-mg. per cent, giving a gradient of 0.5-mg. per cent. The average early strontium clearance in these experiments was 20 per cent. From these data may be calculated a rough estimate of the actual level of citrate in the true venous outflow from bone, $3 + (0.5 \times \frac{100}{20}) = 5.5$. This gives an estimate of about 5.5-mg. per cent in venous blood from bone, or, put another way, the level of citrate in bone is apparently about twice that in the general circulation. Presumably, this is derived from the bone cells. Eight of the 9 normal animals studied showed easily detectable gradients, giving a statistically significant difference, a p value of less than 0.01.

This seems like a reasonable confirmation of the postulate that the fluid bathing the bone crystals differs somewhat in its composition from that seen in serum, and it differs with respect to a very important ion — citrate.

The following questions immediately arise: If the apparent supersaturation of serum results from a local cellular gradient, is this gradient under the influence of the parathyroid gland? Does parathyroid activity influence citrate metabolism in bone?

The cannulation technic previously described was used to study citrate production in bone in dogs under varying levels of parathyroid stimulation. Five dogs were parathyroidectomized, and 14 were given subcutaneous injections of parathyroid extract. They were compared with the 9 normal animals. Serum calcium levels indicated the parathyroid hormone level. Average values were 5.6-, 10-, and 16-mg. per cent Ca for the operated, normal, and injected dog, respectively. Net citrate gradients were 0.2-, 0.5-, and 0.9-mg. per cent respectively. Thus, a direct relation between parathyroid activity and citrate production in bone was observed.

This conclusion might be questioned. It is possible that the extra citrate was derived from marrow, not from bone. This problem cannot be settled with assurance. However, the data in figure 5 show that the blood sample having the greater contribution from marrow exhibits the smaller citrate gradient. In addition, other tissues and organs were studied to learn whether they contributed measurably to the metabolism

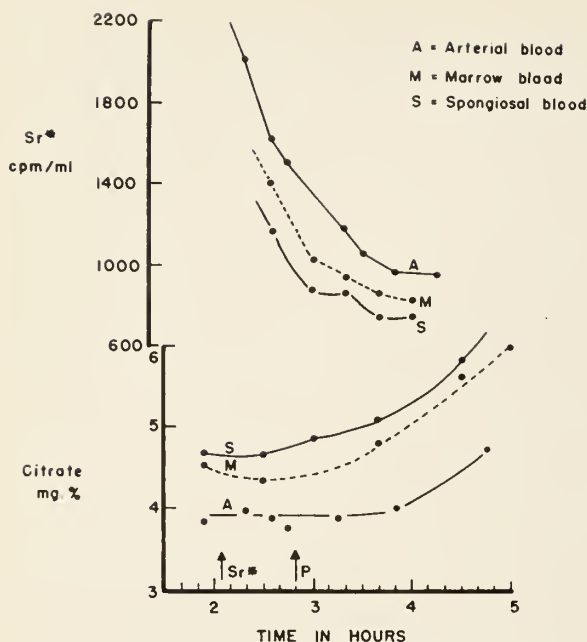


Fig. 5. Curves showing citrate production by bone and its response to parathyroid extract injection (arrow P, 1,000 units). Upper curves show clearance of carrier-free radiostrontium injected at arrow Sr*. Note that the citrate level is inversely related to the clearance of radiostrontium, indicating bone as source of the citrate. Mixed venous blood from the general circulation drawn at intervals throughout the experiment exhibit citrate levels slightly below those of arterial blood. Taken from J. Am. Chem. Soc. 78:3863, 1956.

of circulating citrate. These studies, though limited in scope, suggest that the kidney is the primary site of oxidation of circulating citrate, while bone is an important source of newly synthesized citrate. Liver may also contribute to the synthesis of circulating citrate, but other tissues seemed neither to add nor detract from the circulating supply.

At the present time, the available data are not

adequate or convincing. The data suggest, but do not prove, that localized citrate production may be somewhat tissue-specific—a special characteristic of the metabolism of bone cells.

Also some evidence suggests that the local response in bone to parathyroid is not solely an accumulation of citrate. Analyses for lactate, for example, revealed a pronounced effect of parathyroid extracts on the metabolism of lactate by bone. In normal animals, the bone seems to be utilizing lactate. In dogs rendered hypercalcemic by injections of parathyroid extracts, the bones seem to produce lactate. These are, of course, only preliminary findings, but they suggest that the bone response to the hormone may turn out to be one of generalized acid production. If this proves true, there must also exist a gradient in pH between bone and blood.

In any event, one thing seems established: parathyroid hormone exerts potent metabolic actions. Furthermore, we can, at present, visualize a mechanism by which this metabolic action can result in an altered equilibrium between the body fluids and the bone mineral. The mechanism we have postulated may prove to be incorrect in part or in its entirety, but we can rest assured that this is not the end of the story. On the contrary, we may have every expectation of important new advances in our understanding of bone metabolism. Ultimately, this will lead to improvements in our concepts and management of metabolic bone disease.

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The author is deeply indebted to Hilliard Firschein, George Martin, and Betty Jane Mulryan for permission to describe their observations, largely unpublished, on citrate production by bone under varying levels of parathyroid activity.

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Clinical Manifestations of the Autonomic Nervous System Sequential to Osteoarthritis of the Cervical Spine

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IN THE COURSE OF OSTEOARTHRITIS of the cervical spine (cervical spondylosis), a common condition in persons past the age of 50, osteophytes develop from the uncovertebral joints or the apophyseal joints or from both at the same time. Bony spurs from these joints may jut into the spinal canal, the intervertebral, and the transverse foramina, where they may cause compression and irritation of component parts of both the central and the autonomic nervous systems, thus giving rise to a wide variety of complex neurologic and neurovascular syndromes. The uncovertebral osteophytes possess the greater pathogenic significance.

In osteoarthritis of the cervical spine, the following autonomic nervous structures may suffer damage:

1. The vertebral nerve.
2. The autonomic plexus surrounding the vertebral artery.
3. The autonomic nerve fibers which pass through the fifth to eighth cervical and the first thoracic ventral nerve roots.
4. The deep chain of autonomic ganglia in the transverse foramen between the fourth and the seventh cervical vertebrae.
5. On occasion, the cervical segments of the sympathetic trunks placed on both sides of the vertebral column.

The principal symptoms arising from implication of the autonomic spinoneural structures in the neck are as follows:

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1. Headache.
2. Facial pain (sympathalgia and atypical facial neuralgia).
3. Oto-neuro-ophthalmologic manifestations as they occur in the posterior cervical sympathetic syndrome of Barré and Lieou.
4. Pharyngeal, lingual, and laryngeal paresthesias.
5. Ocular lesions, including optic neuritis.
6. Vertigo.
7. Neurotrophic rheumatism of the upper extremity or the shoulder-hand syndrome.
8. The neurotrophic variety of peri arthritis of the shoulder.
9. Acroparesthesia.
10. Epicondylitis, radial styloiditis, and Dupuytren's contracture.
11. Pseudoangina.
12. Functional and organic heart disease.
13. Pseudopsychiatric disturbances.

The clinical patterns due to involvement of autonomic nervous system structures by cervical osteophytes may be modified by spinal root or spinal cord manifestations when these nervous structures are affected by the skeletal changes of osteoarthritis. The presence of symptoms caused exclusively by osteoarthritis itself further multiplies the clinical patterns.

The prime question is whether osteoarthritic projections in the cervical spine as seen in roentgen films can be considered the cause of neurologic disturbances. Though crowded with large osteophytes, neurologic symptoms can be absent, and the cervical spine itself may be free from pain. On the other hand, major complaints are encountered in the face of little structural change. Furthermore, neurologic symptoms frequently yield to conservative treatment, while the osteophytes themselves remain unchanged.

To explain the incongruities, it is pointed out that an inflammatory factor may augment the mechanical factor of direct compression of nervous structures to bring about neurologic manifestations. Fibrosis of connective tissue elements in the neck, that is, fibrosis of nerve root cuffs, is another factor which can produce symptoms. It also should be remembered that an underexposed x-ray film is necessary to demonstrate osteophytes which are only slightly ossified and that the true size of osteophytes fails to show on the x-ray film because they are covered with cartilage.

In conclusion, the writers wish to draw special attention to three groups of manifestations which may develop in the wake of cervical spondylosis.

1. *Ocular lesions.* Contusion and irritation of the autonomic fibers in the ventral roots by cervical osteophytes may cause vasomotor disturbances (vasodilatation) in the internal carotid vascular tree. This induces development of optic neuritis, which may result in blindness. Cervical traction therapy or surgical liberation of the ventral roots may bring about improvement or recovery.

2. *Cardiac manifestations.* Many physicians claim that there is a causal relationship between cervicovertebral pathology and certain affections of the cardiovascular system. It is maintained that lesions of the cervical spine may produce cardiac arrhythmias (paroxysmal tachycardia and extrasystole), coronaritis, and myocardial heart disease.

3. *Psychiatric disturbances.* The functional disturbances underlying the posterior cervical sympathetic syndrome of Barré-Lieou can be sufficiently severe to produce pseudopsychiatric conditions. The vestibular and the paresthetic forms of the Barré-Lieou syndrome exhibit psychiatric features most frequently. Cenesthopathic and asthenic forms are most apt to obscure the characteristic clinical features of the Barré-Lieou syndrome.

The pseudopsychiatric conditions respond only to etiologic treatment and not to psychiatric management. Hence, physicians should be familiar with the psychiatric disturbances of cervical origin and not employ fruitless or dangerous measures, such as electroconvulsive therapy, but rather apply proper therapy to the cervical spine.

FRACTURE OF THE FEMUR or dislocation of the hip can be rapidly and accurately diagnosed by a sound conduction test. The method is particularly useful at the scene of an accident, in the emergency room, for multiple fractures, or with mass injuries.

With the patient in supine position, legs uncovered, a stethoscope is placed firmly on the symphysis pubis and each patella is struck lightly with a finger. A clear, distinct sound is transmitted by the unbroken bony column of the normal side and a softer, less distinct sound by the injured side.

Weekly use of the conduction test indicates progress of healing. When the sound transmitted by the two sides is equal, roentgenograms almost always show union of the fracture by callus formation.

Diminished sound transmission is found with all fresh fractures of the femur above the supracondylar region, not only those with displaced fragments. Sound changes can also be detected with impacted abducted fractures of the femoral neck, with bone cysts and tumors, and possibly effusion of the hip joint. The sound conduction principle should be adaptable to fractures in other bones.

Effusion in the knee joint, an absent patella, and bilateral bone injury or disease interfere with performance of the test.

LEONARD F. PELTIER, M.D., University of Kansas, Kansas City. GP 17:109, 1958.



Roland G. Mayer, 1891-1958

By J. ARTHUR MYERS, M.D.

ROLAND G. MAYER was born at Summerfield, Illinois, on October 14, 1891. His parents, George and Louise, moved to Minneapolis where he attended grade school and also North High School until they went to New Ulm where he graduated from high school. From 1910 to 1912, he was a student at the University of Minnesota, then transferred to the University of Chicago where he received the degree of Bachelor of Science in 1914. Two years later, he was granted the degree of Doctor of Medicine at Rush Medical College, Chicago. He established a general practice at Cresbard, South Dakota. In 1923, he took postgraduate work in urology at the New York Post Graduate School and Hospital. He then opened an office in Aberdeen, where he practiced urology until a few weeks before his death. In fact, he operated throughout the morning of the day he entered the hospital as a patient. In this specialty, he developed a large practice and was highly respected by patients and their families. His work and contributions were of such fine quality that he received high recognition among urologists everywhere. He was a member of the North Central Section of the American Urological Association and the Twin City Association.

He held membership in numerous other medical organizations, including the Aberdeen District Medical Society, the South Dakota State Medical Association, the American Medical Association, the American Association of Railway Surgeons, the Sioux Valley Medical Association, and the Mississippi Valley Medical Society, of which he had been vice president.

He contributed greatly to the welfare of organized medicine, having served on practically all of the committees of the local and state medical associations. No one in his state was more highly re-

spected and trusted by professional colleagues. Indeed, he was secretary-treasurer of the state medical association from 1943 to 1951 and president from 1953 to 1954. When the state association decided to publish a journal, Dr. Mayer was chosen as editor-in-chief. In his characteristic manner, he not only did splendid editing, but contributed significant articles and fine editorials. He took so much interest in medical journalism that he was active in the American Medical Writers Association of which he was a member of the Advisory Committee. He was also a member of the Board of Directors of State Medical Journals Advertising Bureau.

A long-time friend, Dr. M. R. Gelber, Aberdeen, wrote, "With the death of Doctor Mayer we passed another milestone in the service to humanity. He did a tremendous amount of work not only for our district but also for the State Medical Association. He did everything graciously and willingly and was always ready to listen to all the sides of any problem. His passing leaves a void in our ranks which will be hard to fill for many years. He died as he lived — bravely."

Some of the diseases he treated are contagious and, therefore, he took a special interest not only in controlling them in his community but in the state and the nation. He became the Aberdeen City Health Officer and superintendent of his County Board of Health. He was physician for the Aberdeen Public Schools and a member of the American School Health Association.

His routine practice included many elderly persons, so he took special interest in geriatrics and became a fellow in the American Geriatric Society.

Dr. Mayer continuously emphasized that childhood is the best time to teach good health measures. He served as a member of the South Dakota Sub-

committee on Tuberculosis of the American School Health Association since December 1944 and as chairman since February 1954. He worked with the Brown County and the State Tuberculosis Associations and participated in the actual testing of school personnel and children in his county. This was done so well that most schools qualified for certification.

Following the program of repeating the work every two years, he arranged for the second round of testing to begin in January 1957 and to be completed during the school year. In the summer of 1957, he wrote, "We have found that preparation for the clinics can be accomplished much more easily the second time around, and the details, records, and conducting the tests all work out more smoothly." The demonstration leading to certification of schools interested others to the extent that he was asked to arrange for testing the freshman class at Northern State Teachers College in Aberdeen and also the prisoners in the city jail. He felt that certification of schools was an exceedingly important project and worked toward the goal of having it extended to every school in South Dakota.

He manifested much interest in athletics, including baseball, basketball, football, and golf. These interests took him to the major athletic centers on both coasts and many other places, including Hawaii. He was a fellow of the American College of Sports Medicine.

Dr. Mayer was thoroughly loyal to organizations to which he belonged and to individuals with whom he worked. At the 1957 meeting of the North Central Medical Conference, he was elected president for 1958. When he became ill and was told of his diagnosis, one of his first requests was that the conference be informed. Then he himself tried to locate a successor in his private office in order to avoid any burden that might come to his co-workers or lack of care for his patients.

On October 18, 1917, he married Miss Mildred Austin who died on November 8, 1918. Their son,

Robert, resides in New Orleans. On December 20, 1919, Dr. Mayer married Olive Gabler who, through the years, has contributed so much to his success and to the welfare of their community. Their son, Roland, is engaged in the private practice of medicine in Medford, Oregon, and their daughter, Muriel, lives in Aberdeen where her husband, Dr. B. F. Wallace, is a prominent dentist.

Only a few days before his death, Dr. Mayer called his daughter to his bedside and dictated with a single word between breaths, "My Last Editorial." It is almost the last word of a physician who had led a full life and had contributed significantly to the good of humanity. His editorial appears in full in the January issue of the *South Dakota Journal of Medicine and Pharmacy*, which he had edited since its inception.

Dr. Mayer's case is a striking example of the terrible chagrin the physician suffers when one of his best medical friends appeals for help but a hopeless condition is found. He died from carcinoma primary in the right lung January 8, 1958. Physicians will cease to suffer such experiences only when research is adequately supported to reveal the cause, a biological test, and adequate treatment for bronchial and pulmonary malignancies.

As it is to many physicians, Dr. Mayer's death is a severe loss to me. We have been close friends and have worked together on numerous occasions over the past quarter-century. Whether his work pertained to participation in programs, such as the fiftieth and seventy-fifth anniversaries of Dakota medicine, the South Dakota Association, and Aberdeen organizations or to problems pertaining to the health of school children and private patients and numerous other activities, he always demonstrated unusual ability, unquestioned loyalty, and forthrightness at every turn. To visit or work with him was always most pleasant and profitable because of his geniality and ability to teach all with whom he conversed and worked.

Noludar

will put your patient

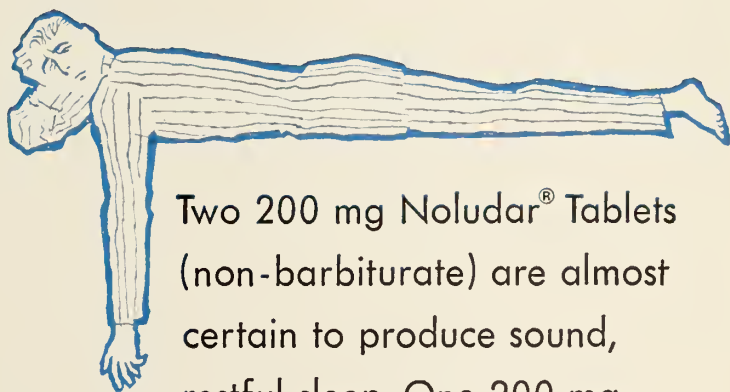
to sleep



and he will not awaken

with that knocked out

feeling



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Medical Radiation Biology, by FRIEDRICH ELLINGER, M.D., 1957. Springfield, Illinois: Charles C Thomas, 945 pages. \$20.00.

The scope of this book is "to cover our knowledge of the biologic effects of radiations in their relationship to diagnostic, therapeutic, preventive, and military medicine." This is indeed an ambitious undertaking, for which the author is to be congratulated. Articles from scientific journals published in English, French, and German are comprehensively reviewed. In all, 4,600 references are included, making this volume an excellent summary of progress in medical radiation biology. The absence of an index, which limits the usefulness of this book as a source of reference material, is at least partially compensated for by the inclusion of a detailed table of contents.

With the ever increasing importance of ionizing radiations in our lives, Dr. Ellinger's book is very timely. It is divided into 4 parts: (1) fundamental radiation biology, (2) biology of ionizing radiations, (3) biology of ultraviolet radiation, and (4) photobiology.

Considerable effort goes into a discussion of macroscopic and microscopic effects of radiations on each organ system in the body. Photographs are used to good advantage to illustrate many of these effects. It must be stated, however, that it is not possible to include sufficient detail on all subjects in one volume to satisfy the specialist in a particular area. For example, the sections devoted to the use of radioisotopes will not satisfy the specialist in nuclear medicine. Thus, this book appears to be most useful as a means for integrating together the many facets of radiobiology on an introductory level.

This book is recommended reading for clinicians and researchers concerned with the effects of ionizing radiations on biological systems.

MERLE K. LOKEN, Ph.D.

The Spine Anatomico-Radiographic Studies, Development and the Cervical Region, by LEE A. HADLEY, M.D., 1957. Springfield, Illinois: Charles C Thomas, 156 pages. \$6.50.

This short treatise dealing with the spine is well illustrated with roentgenograms, diagrams, and photographs. The author, a roentgenologist, concentrates on lesions of the cervical spine, with special orientation to x-ray diagnosis. He describes



in detail a method of visualization of the cervical intervertebral foramina by the oblique radiograph. In this area, x-ray diagnosis is confusing because of superimposed irregular surfaces. Accurate identification of the structures is essential in any assessment of the cervical intervertebral foramina. Dr. Hadley's technic produces clear visualization of the structures by the oblique radiograph.

Differential diagnosis of congenital, traumatic, inflammatory, and degenerative lesions of the cervical spine is the main problem studied. Normal development of the vertebra is traced from its embryologic beginnings in the prenatal period through its postnatal growth and ossification. Abnormal development processes are considered. Clear radiographs and diagrams aid the discussion of disordered segmentation, nonsegmentation, lack of fusion, and spinal dysraphism.

The practical significance of this background material becomes clear in the second half of the book in the discussion of specific disease entities. The congenital anomalies are discussed with their clinical manifestations and in their differentiation from traumatic conditions, such as whiplash injury and cervical subluxation. For example, the ossiculum terminale of the odontoid may be confused with odontoid fracture. Such differential diagnoses of traumatic and congenital abnormalities of the cervical spine are common medicolegal problems.

Foramen magnum encroachment is of some clinical significance, as it may be confused with a variety of conditions, including multiple sclerosis and syringomyelia. It may be due to such lesions as atlanto-occipital fusion or to accessory eminences about the foramen magnum. The symptoms may develop only after the second or third decade and then may be progressive or fatal.

Basilar impression is an invagination of the posterior cerebral fossa and may be associated with flattening of the basilar angle. Platybasia is basilar angle flattening, desig-

nating only that portion anterior to the foramen magnum. These conditions are clearly illustrated with a number of radiographs.

Intervertebral foramen encroachment may be due to osteophyte production from degeneration of disk, covertebral joint, or posterior apophyseal joint. Such encroachment may produce bizarre symptoms in addition to the usual local and referred symptoms. Such bizarre symptoms are thought to be caused by pressure on the vertebral sympathetic plexus. This section is followed by the author's standard technic for the oblique cervical radiograph. The appearances of the normal for this technic are described.

JOHN MOE, M.D.

Dermatologic Formulary, edited by FRANCES PASCHER, M.D., ed. 2, 1957. New York: Paul B. Hoeber, Inc., 172 pages. \$4.00.

This compact volume on dermatologic therapy is the second edition of a formulary emanating from the New York Skin and Cancer Unit. The first section of the book deals with topical measures. Following a brief description of each proprietary product or dermatologic prescription, explanatory notes on actions, uses, indications, contraindications, and directions for use are given. Systemic therapy is presented in the second section. Included are many useful oral and parenteral drugs. Again, after a brief description of the preparation, its action, uses, indications, contraindications, and directions for use are given. The next portion of the book deals with local anesthetics, biologicals, cauterizing agents, dressings, and so forth. The final section contains some useful therapeutic aids and samples of printed instructions for patients. This book is well indexed for ready reference. It contains a wealth of authoritative information on dermatologic therapy and should be a valuable aid to all practitioners.

ELMER M. HILL, M.D.

Urine and the Urinary Sediment, by RICHARD W. LIPPMAN, M.D., ed. 2, 1957. Springfield, Illinois: Charles C Thomas, 140 pages. \$8.50.

This monograph, first published in 1952, is designed to "serve as a practical guide in the clinician's examination of urine and the urinary sediment and as a record of methods and interpretations that have

(Continued on page 26A)

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BOOK REVIEWS

(Continued from page 24A)

evolved during a long period of careful observation." The text of the second edition has been extended to include short discussions of additional topics, such as chyluria, virus infections, purpura, potassium depletion nephropathy, sickle cell anemia, polycythemia, and physical trauma. Thirty-six additional color plates have been added, making a total of 92, which maintains the fine quality of the first edition, and the bibliography has been extended from 93 to 232 references.

The basic outline of the original edition is maintained. In the first section, Dr. Lippman presents a concise discussion of the clinical and pathophysiologic significance of proteinuria and each of the formed elements of the urinary sediment.

The second section is concerned with specific clinical diseases and the urinary findings in each, which are correlated with the underlying pathologic process within the kidney or urinary collecting system. Special emphasis is placed on the fact that the findings of urinary examination reflect only the pathologic process and must be considered in the light of clinical findings in order to attain proper significance.

The final section of the monograph is devoted to general consid-

erations regarding urine volume, its appearance, odor, and so forth and technics of urine collection and general examination, equipment, and material necessary for basic office procedures and an outline of the special technics involved in testing for about 30 abnormal urinary constituents.

This monograph serves as a guide to the technic and interpretation of more complete urine analysis and also as an excellent atlas of the urinary sediment.

DONALD BRAVICK, M.D.

•
Methods in Surgical Pathology, by HENRY A. TELOH, M.D., 1957. Springfield, Illinois: Charles C Thomas, 127 pages. \$4.75.

This small volume is written for the beginning student in surgical pathology, instructing him in the proper handling, gross description, blocking, and microscopic examination of surgical tissues. The writing is straightforward and concise but still detailed, covering in the 36 chapters the fine points of examination in all the major body systems. Separate chapters discuss frozen section, bacterial and fungus cultures, and prognosis in surgical pathology. This book fills a definite hiatus in the material written for resident training and, as such, should find wide

acceptance in all hospitals or institutions giving instruction in pathologic anatomy.

JOHN I. COE, M.D.

•
Doctors and What They Do, by HAROLD COY, 1957. New York: Franklin Watts, Inc., 180 pages. \$2.95.

This is an interesting and very complimentary book pertaining to the profession of medicine. It is a round-by-round description of the life of a doctor. First, the reader meets him on his daily calls doing his best to cure, relieve, or comfort his patients. Then follows the reaction of hopeful anticipation and solace on the part of the patient and family to the doctor's presence.

Various chapters discuss the family doctor, the specialist, the hospital, the public health organization, and the various advances made in the medical and surgical fields which have saved lives.

The book is an excellent espousal of the nobility of medicine.

The description of the doctor's life, the educational requirements, the labor involved, and the satisfactions gained make it a good reference book for high school and college libraries for students who contemplate the career of medicine.

ARNOLD S. ANDERSON, M.D.

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Prefatory Note from the Director-General of WHO

Dear Professor Anderson:

It is most gratifying to learn that The Journal Lancet is devoting its June issue to public health matters, as a most appropriate way of marking the occasion of the Eleventh World Health Assembly which is meeting in Minneapolis during most of that month. I believe I need not tell you what a great pleasure it will be for all those participating in the Assembly either as members of delegations or of the Secretariat to have this opportunity of visiting your State which has achieved such outstanding progress in the field of public health.

Compared with therapeutic medicine, the roots of which reach deep into the soil of history, public health and preventive medicine are relative newcomers. However, in the last hundred years and particularly during the present century, they have made considerable advances. It is being gradually realized that therapeutic and preventive medicine are really inseparable and an ever-increasing effort is in progress to make the doctors of tomorrow more preventive-minded.

There is good evidence that today, governments and peoples are accepting that health, like peace, is indivisible, and that it is in each country's interest that the peoples of other countries should live in healthy conditions. More and more widely the definition of health given in the Constitution of the World Health Organization—"a state of complete physical, mental and social well-being"—is being adopted as an attainable if distant goal.

The combined techniques of clinical medicine and public health can together work veritable miracles in raising levels of health, and levels of prosperity too, throughout the world. This is the vision and the belief on which the work of the World Health Organization is founded. During its first decade of existence, it has benefited greatly from the support of your Government in its councils, and the co-operation of some of your best health experts in its programmes. One important advantage that we shall derive from the generous invitation of your Government to hold this year's Assembly in Minneapolis will be the occasion thus offered to strengthen these links with the medical profession in your great country.

Yours sincerely,

A handwritten signature in dark ink, reading "M. G. Candau". The signature is fluid and cursive, with a long, sweeping underline that extends to the left.

M. G. Candau, M.D.
Director-General

Letters of

to Delegates and

of the

Dr. Anderson

It gives me a great deal of satisfaction to welcome the delegates from the 88 member nations of the World Health Organization to the Eleventh Annual World Health Assembly.

We in this country welcome the opportunity to act as host during the assembly sessions and to join with you in the Tenth Anniversary Celebration of the World Health Organization. In a decade WHO has grown from a dream of international health cooperation to a solid reality. It serves the health needs of millions of people throughout the globe. The achievements of WHO -- in disease eradication, in sanitation and communicable disease control, in nutrition, in the training of health workers, in the exchange of health information -- have been many. They are a new and inspiring chapter in man's long struggle for a better and happier life.

Only by putting into practice the high ideals of international cooperation have these achievements become possible. Only by the dedicated efforts of the men and women who serve the cause of world health -- as members of expert panels, as professional workers in the field, and as friends and supporters of the World Health Organization -- has this progress been made year by year.

You who are meeting here for the Eleventh World Health Assembly will be seeking means not only to extend that progress but to meet new and emerging health problems. To this effort, we in the United States pledge our continued support.

We take a great deal of pride in the contributions this nation has made toward the improvement of world health. At the same time, we acknowledge with gratitude the great contributions which the member nations of the World Health Organization have made to the health of the people of the United States and to other nations.

In this spirit of mutual effort, we welcome you to America. We hope you will be able to visit many of our universities, our medical training and research centers, our hospitals and clinics, and our health agencies. You will be welcome everywhere to share knowledge and experience, and to exchange views on health matters.

We wish you every success in your Assembly sessions and in your plans for the future. In your hands, the future is no less than the highest possible levels of health and well-being for all the peoples of the world.

Sincerely yours,

W.C. Sullivan
Surgeon General



STATE OF MINNESOTA
EXECUTIVE OFFICE
SAINT PAUL 1

To All Delegates and Representatives
to the
Eleventh World Health Assembly:

On behalf of the citizens of the State of Minnesota it is my privilege to extend our most sincere welcome to each of you. Your presence is indeed an honor.

The achievements of the World Health Organization are an inspiration to all of us. History will reveal the ultimate victories to overcome the present burden of human suffering secured through the courageous, sustained efforts of the member nations of the World Health Organization.

We are united with you in the firm belief that "unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger." Without question "health of all peoples is fundamental to the achievement of peace and security."

We take pride in the fact that citizens of this State have had the opportunity to take part in your deliberations at previous World Health Assemblies as delegates from the United States of America. The State is honored that some of its citizens presently are privileged to serve on your expert advisory panels, and a number of them are members of WHO technical assistance teams serving in many parts of the world. That our University of Minnesota has been selected as a training center for medical and health personnel from all parts of the world is a distinction in which we take considerable satisfaction.

Most of us are unable to make a direct contribution to this global battle through the application of our technical skills, but I can assure you that all of the citizens of this State are strong in their support of your great contribution to international health and world understanding.

Sincerely yours,

Orville L. Freeman
Orville L. Freeman
GOVERNOR

Welcome

Guests

WHO Assembly

UNIVERSITY OF MINNESOTA
MINNEAPOLIS 14

Dr. Anderson:

On behalf of the University of Minnesota I am delighted to extend a cordial welcome to the representatives of the 88 nations in the World Health Organization. We are happy to have you on our campus in our state.

Whatever devices man can conceive to promote world peace, ultimately the goal is to bring the peoples of the world closer together and to a greater understanding of each other. Surely the World Health Organization through its International Sanitary Regulations, the standardization of drugs in international units, the promotion of international health research, and the world-wide dissemination of health information in making a signal contribution toward this objective.

It is our earnest wish while you are in our state to do everything possible to make your visit here a productive and enjoyable one. We are proud of the health record of the people of our state and of their support of medical education as represented in the University's College of Medical Sciences. We are proud, too, of our relationship with the world-renowned Mayo Clinic in Rochester and our association with them in graduate medical education through the Mayo Foundation of the University's Graduate School.

It is a privilege to have the World Health Organization in our midst. Its humanitarian objectives and its vital effectiveness in the work of the United Nations we salute.

With friendly greetings.

Sincerely,

J. L. Morrill
J. L. Morrill
President



STATE OF MINNESOTA
DEPARTMENT OF HEALTH
UNIVERSITY CAMPUS
MINNEAPOLIS 14

To All Delegates and Representatives
to the
Eleventh World Health Assembly:

Minnesota is proud to be host to the eleventh annual World Health Assembly. As Secretary and Executive Officer for the Minnesota Department of Health I am honored to welcome all Delegates to this State.

It is a tribute to the governments of the member nations that their awareness of the value of health and the eradication of disease brought this international health agency into being. Its impressive record of accomplishments in the ten short years of its existence is an inspiration to all persons dedicated to the principle that good health for all peoples everywhere is an attainable goal.

There has been unequal progress in mankind's battle against disease. Where technical means exist for the attack against certain preventable diseases we do not always have practicable methods for the application of this knowledge. Even where progress is greatest these practicable preventive measures have been applied for the benefit of too few of the world's total population. These gaps exist in all nations, our own included.

The eradication of disease, the education and training of medical and health personnel, the encouragement of research, and the strengthening of public health services is our common concern.

All nations have contributed to the progress that has been made in the general improvement of health. We are confident that through our united efforts we will continue to raise the social and economic conditions of all peoples, and that through the broad and constructive programs of the World Health Organization we will further reduce sickness, poverty and death.

Respectfully,

R. N. Barr

Robert N. Barr, M.D.
Secretary and Executive Officer

MAYO CLINIC
ROCHESTER, MINNESOTA

SURGICAL SECTION
OF
C. W. MAYO, M. D.

To all Delegates and Representatives
to the
Eleventh World Health Assembly:

It is my privilege and pleasure, as chairman of the Minnesota WHO and Centennial Health Committee, to extend heartfelt greetings to each of you.

Having served twice as a member of the United States Delegation to the World Health Assembly, I am aware of the multitude of problems pertaining to the health and welfare of man as a whole, with which you are and will be confronted. Your dedication to practical deliberations in the interest of better health and the carrying out of needful technical assistance will achieve more than international improvement of health. It epitomizes man's concern for man beyond national boundaries and must therefore be a moral force of inestimable value in the promotion of what is closest to the heart of man -- a continuing meaningful peace.

As we greet old friends and make new ones, let us not lose sight of our real objective -- a united effort to improve health of man, wherever and wherever he may be.

May your deliberations be profitable to the cause and may your stay in Minnesota be pleasant. We are honored by your presence.

Charles W. Mayo

Charles W. Mayo, M.D.

The Journal Lancet

SERVING THE MEDICAL PROFESSION OF MINNESOTA,
NORTH DAKOTA, SOUTH DAKOTA AND MONTANA

FOREWORD. Never before in the 89 years of JOURNAL-LANCET's history has it been possible to publish an issue concerning health of people and their domestic animals on a global basis. With Minnesota celebrating its hundredth year of statehood and with the World Health Organization holding its 11th annual Assembly meeting here, a unique opportunity loomed to present the readers of this Journal with health information from everywhere on earth. It is our good fortune to be located in the shadows of one of the world's excellent Schools of Public Health and an efficient State Board of Health only two years younger than *The JOURNAL-LANCET*. The contents of this issue of international scope were made possible by Dr. Robert N. Barr, executive secretary of the Minnesota State Department of Health, and Dr. Gaylord W. Anderson, director of the School of Public Health, University of Minnesota.

We are especially grateful to Dr. Anderson who kindly consented to serve as guest editor for the large volume of work required to organize, procure manuscripts, and edit this issue.

It is a genuine pleasure to speed on its way this special issue, the contents of which should be helpful to workers everywhere in their promotion of individual work and projects insuring better health and longer, happier, and more efficient living for the citizens of the world.

J. ARTHUR MYERS, M.D.

"LEST WE FORGET"

*The tumult and the shouting dies;
The Captains and the Kings depart:
Still stands Thine ancient sacrifice,
An humble and a contrite heart.
Lord God of Hosts, be with us yet,
Lest we forget—lest we forget!*

Rudyard Kipling 1897

A GREAT CELEBRATION was terminating when Rudyard Kipling penned his inspiring "Recessional" which contains this sobering challenge and warning. Although written for a certain occasion, these lines may nonetheless be appropriate to many other observances, including that to which Minnesota is currently the honored host.

Both the City of Minneapolis and the State of Minnesota are proud and gratified that the World Health Organization has chosen to hold its annual Assembly in our midst. We are pleased that the year in which we can serve as host should be that in which the Organization is celebrating ten years of remarkable accomplishment. THE JOURNAL-LANCET joins in extending to our visitors a most cordial welcome and heartiest congratulations. The story of progress told in this issue far exceeds the fondest hopes of those who at the end of World War II envisioned what might be done by a strong international health agency supported by the family of nations and dedicated to human welfare without regard to race, color, creed, or political philosophy. What has been accomplished represents international cooperation at its best and should give courage and new hope to all who believe that world peace is possible through mutual understanding and service. THE JOURNAL-LANCET is proud that it can tell this story to its readers.

As we review international accomplishments, it is well in this centennial year of Minnesota that we should also pause to examine progress in public health. The past hundred years have been marked by outstanding accomplishments in disease control. Many diseases that were commonplace to our grandparents have all but vanished. The expectation of life has in-

creased and no longer are our cemeteries crowded with the bodies of small children whose deaths were so unnecessary.

As we pause to pay well-deserved respect to those who have made health progress possible and to celebrate the accomplishments of the past decade in world health, let us not forget our obligations. As we here in Minnesota reflect upon our good fortune of freedom from diseases of major import in other countries, let us avoid the temptation to complacency. May we remember that, while our problems differ, we have nonetheless a duty to achieve reductions in other diseases which each year exact a heavy toll of needless illness and death.

Of even greater importance is our obligation to furnish strong support to international agencies, such as the World Health Organization. Poverty and disease are the seedbed of unrest. So long as we realize that over half of the world still lives under thatch and mud, that in spite of remarkable progress millions of lives are being needlessly lost each year, that children in many areas have never known the feeling of a full stomach—so long as such conditions exist, we can never with a clear conscience escape our personal and national obligation to share to our utmost in help to our fellowman wherever he may be in need.

THE JOURNAL-LANCET joins gladly in the welcome to our visitors and extends to them and their organizations its heartiest congratulations. This is a joyous and proper celebration of remarkable achievements. At the same time may we hope that those of us who remain after our visitors depart will heed Kipling's warning against complacency, "lest we forget—lest we forget." GAYLORD W. ANDERSON, M.D., *Guest Editor*

**Regional
Directors**
*of the
World Health
Organization*



I. C. Fang, M.D.
*World Health Organization Regional
Director for the Western Pacific*



Fred L. Soper, M.D.
*World Health Organization
Regional Director for the Americas*



Chandra Mani, M.D.
*World Health Organization
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Paul J. J. van de Calseide, M.D.
*World Health Organization
Regional Director for Europe*



F. J. C. Cambournac, M.D.
*World Health Organization
Regional Director for Africa*



A. H. Taba, M.D.
*World Health Organization
Regional Director
for the Eastern Mediterranean*

Public Health

in Africa

F. J. C. CAMBOURNAC, M.D.

Brazzaville, French Equatorial Africa

THE AFRICAN REGION presents a variety of climatic conditions, including two deserts and one temperate zone in the south, areas of high altitudes with equatorial or tropical climates similar to temperate climates, and small areas with perpetual snow. In addition to this diversity of environment, Africa is also comprised of a variety of ethnic groups and habits.

The problems found in Africa in the field of public health are on the whole not very different from those found in many parts of the world, and, during the last ten years, very important developments have taken place in the field of public health.

Each government in the African Region of WHO endeavors to solve these problems according to the means available and the magnificent results already achieved, which no doubt are among the most valid ever undertaken in Africa, are only matched by the formidable task still to be accomplished.

The WHO Regional Office started its work in Africa in 1952.

The role of WHO consists, within its limited means, of assisting governments in their endless task, and, whenever these problems extend beyond the national political boundaries, it attempts to coordinate efforts in order to ensure greater effectiveness.

Historically, the activities of health services tended to meet the immediate demands; in other words, to fight the great endemics of smallpox, sleeping sickness, yellow fever, malaria, yaws, leprosy, and so forth, but, at the same time, the basic services were developed according to possibilities.

Yellow fever has practically ceased to present a menace in Africa. Banned from the cities, thanks to mass vaccination, the disease is nowadays confined to certain forest or bush areas, where some animal species constitute an inexhaustible virus reservoir which can be controlled at the price of a few elementary precautions.

The fight against *smallpox* has given rise to some of the greatest victories of man over the opposing forces of nature. Smallpox has not

F. J. C. CAMBOURNAC is World Health Organization regional director for Africa and is located in the Regional Office at Brazzaville, French Equatorial Africa.

been eliminated from the African continent, but it no longer creates havoc among entire populations.

Sleeping sickness and animal trypanosomiasis have been brought under control in most inhabited territories. Almost everywhere, the incidence of the disease has been reduced to a negligible level. The era of great epidemics is past, thanks to effective and unrelenting control. Nevertheless, in spite of all efforts, animal trypanosomiasis still presents many a technical and complex problem which the governments endeavor to solve, particularly through measures aimed at eradication of the tsetse fly.

Thanks also to the introduction of such products as residual insecticides, new antimalaria drugs (particularly chloroquine and pyrimethamine), penicillin, and sulfones, it has been possible in the course of the last decade to reduce considerably the prevalence of such scourges as malaria, venereal diseases, treponematoses and leprosy.

The discovery of new antituberculosis drugs, such as streptomycin, PAS, and isoniazide, may one day allow the launching of a mass attack against *tuberculosis*, which is found to affect more Africans than originally thought.

The most gratifying results have been achieved in the fight against yaws, the most hideous of all treponematoses, which affected some 20 million Africans of which some 5 million are already cured.

Lesser known to the public, other diseases, such as bilharziasis and onchocerciasis, are still difficult to combat. Nevertheless, vast areas in which onchocerciasis had driven away the population have been reclaimed thanks to the eradication of the vector fly.

The very conditions under which the great endemics were fought also determined the structure of health services in Africa. On the one hand, there are the fixed urban centers, which are served by the hospital, the dispensary, and the treatment center, and, on the other hand, the mobile units serve the rural areas and perform large-scale mass vaccinations.

The incidence of diseases, such as malaria, bilharziasis, and tuberculosis, is still so high in Africa that repercussions on economic and social conditions are undeniable.

Health of the population is one of the basic principles of economic and social development anywhere in the world. However, since public health depends greatly upon the economic and social conditions prevailing in a given country or territory, the intimate interdependence of health, social, and economic factors is understood. In

other words, in the absence of a general improvement in living standards, no large scale progress can ever be attained.

The governments of this region are fully aware of this inter-relationship, and they have always endeavored to bring their efforts to bear simultaneously on all levels of public life. Progress in one sense may be irremediably compromised or defeated in the absence of combined efforts in other fields.

This state of affairs, which has existed in Africa for centuries, calls for the following general considerations, which the governments found through experience and which WHO now attempts to acknowledge.

1. For many years to come, the fight against the great endemics will continue to claim the brunt of the activities of the public health services.

2. If the activities of these services are sometimes sufficiently comprehensive to deal with the situation in urban centers, they are still insufficient in the rural areas.

In order to establish more comprehensive, better equipped and more effective services, the number one problem consists of training more personnel at all levels from the medical doctor to the most humble health auxiliary in the bush.

Without prejudice to the indubitable advantages presented by mobile units in the emergency battle against one or the other of the great endemics, present trends are toward the establishment, as far as possible, of rural health centers with many-sided activities, both curative and preventive, to gradually replace the purely mobile services.

Finally, within the health services, more and more emphasis is placed upon providing specialized personnel and the development of services in the field of *maternal and child welfare, nursing, nutrition, environmental sanitation and hygiene, and health education of the public.*

Any improvement of these 5 factors is once again closely related to economic resources and social factors which determine the ways of life of the African populations.

To a large extent, the assistance lent to countries and territories in Africa by WHO consists of the organization and coordination of surveys and campaigns, particularly in the fields of communicable diseases, control, and nutrition. In addition, attempts are being made to strengthen the extensive network of national health services so they will be capable of absorbing and administering the special services set up to solve specific problems. In accordance with the general policy of the organization, a growing import-

ance is being attached to the development of basic public health services. Hence, priority has been given to training and instructing personnel, as this is the best way to reinforce and develop existing health services.

This form of assistance, either through actual control in the field, the creation of pilot areas, the provision of consultants and specialists, or training courses and fellowships, accounts for 90 per cent of the combined budgets of WHO, the United Nations Technical Assistance Board, and the United Nations International Children's Fund (UNICEF) in Africa. By the end of 1957, the contributions from these sources toward improved health conditions in the African continent amounted to some \$15,000,000.

THE FIGHT AGAINST COMMUNICABLE DISEASES

Malaria. Of the total African population south of the Sahara, an estimated 116 million people live in malaria-ridden areas in which they are continuously exposed to the disease. However, great progress has been made against malaria, particularly, in post-war years. For many years, the western coast of Africa has not deserved its reputation of the "White Man's Grave."

Of all tropical diseases, malaria is undoubtedly the most devastating. It slowly weakens the human body, thus preparing the way for fatal developments. Because of the immunity acquired by the African in early childhood, which protects him in adulthood, malaria mortality chiefly affects the infant group. Is this not a heavy price to pay for this immunity which enables the African to support a number of mosquito bites day after day or, rather, night after night without apparent ill-effects, one of which would suffice to infect a nonimmune person?

It is only natural that the fight against malaria was initially confined to the urban centers. The discovery of residual insecticides, particularly DDT (dichloro-diphenyl-trichloro-ethane), and the introduction of mass spraying methods in the years following the last war completely changed the approach to malaria control. Previously, control was largely defensive. However, with the new insecticides, man began to attack his number one enemy, the *Anopheles* mosquito, this terrible vector of malaria which, in the past, brought about the ruin of several civilizations. It was in the Natal province (Union of South Africa) that the control of malaria by fighting adult mosquitoes took place when only pyrethrum was available as an insecticide.

By restricting malaria control to the urban centers, it was possible to protect many people within a small area without great expense. The

problem is very different, however, in rural areas, and the difficulties encountered are almost insuperable. As the areas to be protected increase in size and the population to be covered becomes scarcer, one is faced with problems of time and transportation, recruitment and training of specialized personnel, provision of the necessary spraying equipment and insecticides, the attitude of the population and the opposing natural conditions, but, above all, the often unexpected and unforeseeable variations in the bionomics of the vector mosquito according to environment. It was soon found that without sound and accurate planning, any control campaign was doomed to failure.

Nevertheless, the governments concerned courageously attempted to solve an apparently desperate problem. The results obtained in some parts of the world—South America, Europe, and Asia—were most encouraging, although conditions were very different. In the Union of South Africa and in Swaziland, it was proved that malaria can be eradicated in subtropical areas, as evidenced by results achieved in certain malarious areas of the Transvaal.

In the field of research, a number of centers were established in several parts of the continent, such as the East African Institute of Malaria and Vector-borne Diseases at Amani (Tanganyika), the Federal Malaria Service of Nigeria in Yaba-Lagos, the Service General d'Hygiene Mobile et de Prophylaxie (SGHMP) laboratories in Bobo-Dioulasso (French West Africa), the laboratories in Salisbury (Federation of Rhodesia and Nyasaland), the Malaria Centre in Lourenço Marques (Mozambique), and the laboratories in the Belgian Congo. Several of these centers enjoy active support from WHO, which, in 1950, convened the first African Conference on Malaria in Kampala (Uganda) to study the conditions of control in the African continent.

As a result of this conference, it was decided to establish a number of pilot zones representative of geographic and climatologic conditions in a given area, which, if results were satisfactory, would be the starting points for mass malaria control campaigns. The principal approach was an attack on the adult mosquito by means of various insecticides, the comparative values of which were being studied concurrently, particularly DDT and BHC (benzene hexachloride), to dieldrin, chlordane, and lindane which were added later. For five years, that is, until 1955, the resolutions of the Kampala Conference were enforced practically everywhere in the continent.

WHO was able to participate directly in the efforts of the governments in several countries

and territories with material assistance from UNICEF in some instances, and control campaigns were rapidly extended. By the end of 1955, the results already obtained were considered most encouraging. In some countries, such as the Union of South Africa, Southern Rhodesia, Swaziland, and Madagascar, malaria seemed to be nearly eradicated. In any event, the disease no longer presented a major public health problem in these territories.

However, in the fall of 1955, when the second Malaria Conference in Africa convened in Lagos under the auspices of WHO, the participants received a shattering piece of news. In the Sokoto pilot area, some anopheline species appeared to resist insecticides. Fortunately, however, they seemed to resist only certain products, such as dieldrin and BHC, and did by no means compromise the encouraging results already obtained, but the alarm was given.

The problem is very complex in most areas of Africa, and, in view of the many technical difficulties set forth at the Lagos Conference and the lack of accurate knowledge of the often mysterious conditions which accompany the occurrence of malaria in Africa and, above all, of the behavior of its main vector, *A. gambiae*, the participants acknowledged that complete interruption of malaria transmission in this region was still out of reach. But, it was also recognized that results already obtained in many parts of the continent justified great hopes.

The already very high costs of malaria control may run even higher in areas where the application of insecticides alone proves inadequate and where antimalaria drugs must be distributed to the population in an attempt to pave the way for malaria eradication through combined action against both the human and the insect reservoir.

Following the Lagos Conference, the entire approach to malaria control in Africa was reviewed, with particular reference to control conditions in the equatorial belt of the continent where, after an often spectacular drop, the infection rate tends to remain at a certain level despite efforts to reduce it further.

Among the main measures advocated by the malaria experts were the establishment of new pilot zones, where research and practical study may enable gradual and nation-wide extension of future mass campaigns.

In addition, WHO set up a number of malaria advisory teams for on-the-spot study of control conditions and methods upon request of the governments. Another special team was also set up to study the behavior and bionomics of *A. gambiae*, man's principal enemy in Africa. It is

hoped that in not a too distant future the work under way will result in methods with which it will be possible to undertake malaria eradication in the whole African region.

Yaws and other treponematoses. In the fight against the great endemics of tropical Africa, the most gratifying results are undoubtedly those against yaws. The success of yaws control is not only wrought by the magic of penicillin but also to a very great extent by the painstaking and unrelenting efforts of the health services and the enthusiasm of the public in the face of the spectacular results obtained in so short a time.

In the early postwar years, an estimated 20 million people suffered from yaws in Africa. By the end of the first quarter of 1957, 5 million people had been treated, requiring the examination of some 8 million persons living in endemic areas of yaws.

The establishment of rural health services is greatly facilitated because of the interest and enthusiasm aroused in the population by the successful development of the yaws campaigns, and, in some areas, for instance, in Nigeria, the population is sufficiently interested to pay for the establishment of health centers.

Leprosy. The introduction of sulfones brought hope to the hearts of all those stricken with this age-old infection. Moreover, it also enabled mass case-finding and treatment campaigns to be launched between 1951 and 1953. Today, the battle against leprosy in Africa, which has now reached its culminating point, is the largest ever.

The number of Africans stricken with this disease is difficult to assess, for here too accurate statistics are lacking in many parts of the continent. In French West Africa, French Equatorial Africa, Gambia, Ghana, Nigeria, and Uganda, where WHO and UNICEF participate in the battle against leprosy, it is estimated that case-finding alone will involve examination of some 60 million people. According to present estimates, the total number of people afflicted with leprosy in Africa ranges from 1½ to 2 million, as compared to a world total of some 10 or 12 million. Of these, around 1 million are already receiving treatment.

In French Equatorial Africa, the number of cases treated by the mobile units of SGHMP increased from 2,200 cases in 1951 to 118,000 in 1956 and reached about 140,000 in 1957.

In Uganda, 30,000 leprosy patients were treated in 1956 as against 4,000 in 1951.

In Nigeria, around 250,000 persons are under treatment for leprosy and as many in the Belgian Congo, while about 125,000 patients are already under treatment in French West Africa.

One is surprised to note the enthusiasm with which the leprosy patients submit themselves to treatment. In French Equatorial Africa, for instance, of 118,000 patients treated in 1956, 98,000 had not omitted one treatment session over the last two years. Needless to say, an organization providing such treatment and operating on weekly or fortnightly treatment tours, requires considerable means, particularly transportation. The breakdown of one vehicle may mean interrupting treatment of 2,000 patients. And if, as in most cases, there are no roads at all, well, there are bicycles, camels, horses, and even pirogues.

The leper suffers from two diseases: leprosy and being a leper. For many centuries, throughout the world, the unfortunate leper was considered an object of horror and dread, banned from society, and condemned to live in abject misery in the so-called leprosary. Today, much of the stigma attached to leprosy has been lifted, and the leprosaria are gradually being replaced by leprosy villages in which only those who still present a danger of contagion or who are so mutilated that they are no longer able to ensure their own subsistence are kept, often surrounded by their families, in order to facilitate treatment.

Everywhere in Africa, campaigns are developing at a growing rate. Wherever WHO does not play an active part in the physical implementation of these campaigns, it contributes through its fellowship program to a widening of the knowledge of those responsible.

Tuberculosis. It is interesting to note that precisely at a time when tuberculosis tends to disappear from Europe and North America, its prevalence is increasing in Africa. This is another example of the inter-relationship between the evolution of disease and that of human society. One may reasonably expect that, just as the discovery of sulfones enabled mass treatment of leprosy, the introduction of very potent drugs, such as streptomycin, PAS, and, especially, isoniazide, will soon allow a full-scale attack against tuberculosis, though preparatory work may be considerably longer in view of our incomplete knowledge of the disease and its incidence.

Following the technical discussions at the WHO Regional Committee for Africa in Luanda, in September 1956, one of the participants summed up the situation in these words: "The present trend of tuberculosis in Africa makes this disease the most alarming endemy." The success achieved throughout the world by the mass BCG vaccinations confers a certain authority on WHO in this field. Their effectiveness is now acknowledged on condition that the methods of application are carefully studied in advance.

In view of the concern of the governments in Africa, WHO decided to set up several survey teams to collect the necessary epidemiologic data on the prevalence and manifestations of the disease in Africa. These teams generally consist of 1 medical officer, 1 or 2 specialized nurses, 1 x-ray technician, 1 laboratory technician, and 1 statistician. Two such teams were assigned in 1955 and 1956, respectively, to the east and to the west of the continent.

The work of the teams consists of tuberculin testing and collecting sputum in a sample group of the population, as well as administering BCG vaccinations to the more vulnerable groups and participating in appropriate health education activities.

Naturally, governments had already undertaken to combat the disease in their territories. Drug treatment campaigns are under way in the Union of South Africa. Other WHO and UNICEF assisted projects are being developed in Kenya and Nigeria.

Other communicable diseases. Many other communicable diseases require the attention of the health services in Africa as elsewhere in the world. Trypanosomiasis in men and animals is one of the most important problems in Africa. There is still much to do before it is controlled, but the results already obtained by government services are remarkable.

Two other diseases that are receiving special attention from WHO in view of their high prevalence in some areas are bilharziasis and onchocerciasis.

PRESENT TRENDS

The great majority of Africans live in a rural environment. The efforts of the governments were previously brought to bear mainly on the urban centers where the needs were more pressing and where control activities are both easier to organize and less costly. However, today, the same governments tend more and more to develop their health services in rural areas. WHO plays an important role in this field by considering with the governments the important and numerous rural public health problems, by giving advice on organization and orientation of the rural services and, finally and above all, by direct contributions to the control of communicable diseases. Present trends consist of developing more comprehensive health services capable of subsequently absorbing the special services set up to solve specific problems.

Maternal and child health. The considerable development which the maternal and child health services are bound to undergo augurs well

of the future. These services have existed at all times. Nevertheless, WHO is endeavoring at present to develop them in many different countries whose governments have requested UNICEF assistance. WHO keeps informed of progress by sending consultants to collect data and inform governments of measures taken elsewhere in the world. These consultants act somewhat as liaison officers, accumulating knowledge and formulating recommendations to ensure more rapid and less costly development of these services.

Nursing. Africa lacks medical officers, nursing personnel, and health auxiliaries. This shortage possibly constitutes the most critical aspect of the many public health problems of the continent. Obviously, no large-scale operations can be launched as long as there is a shortage of the necessary personnel. In addition to personnel called upon to ensure routine nursing services, emphasis should be placed for many years to come on training auxiliary personnel for many large-scale activities, such as mass vaccination or mass treatment campaigns requiring priority that may not be assured by specialized personnel only.

WHO endeavors to provide a teaching staff of nurses, midwives, and public health technicians to train local personnel who, in turn, will be able to train other nurses, midwives, and auxiliaries. WHO also lends assistance to professional training institutions, often with material help from UNICEF. It is also desirable that the curricula of the schools and, more generally, that for the training of nursing personnel be standardized within the continent in order to achieve higher training standards.

Today, WHO takes part in nurse training programs in many countries and territories, either by providing teaching personnel and equipment or by awarding fellowships which enable the beneficiaries to acquire new knowledge abroad in the vast field on which the health of the entire population so greatly depends.

Nutrition. The problem of nutrition is intimately linked to the problems of agriculture and soil erosion. It is also closely related to the supply of meat and fish, and even to certain taboos. Many different disciplines are involved: agronomists, educators, veterinarians, medical officers, and laboratory technicians.

For many years, the governments endeavored to assess the true state of nutrition in their respective countries. Africa is not so much an undernourished as a malnourished continent, where an unbalanced diet may lead to serious physiologic disorders. The most serious syndrome is called "kwashiorkor" and may be fatal.

On the other hand, it has been shown that nutritional deficiencies, if not always resulting in such serious disorders as kwashiorkor, favor the occurrence of debilitating diseases. The most dangerous period occurs immediately after an infant is weaned, when breast milk is replaced by the adult diet, which is often poor in proteins.

The governments endeavor to supplement a deficient diet by enhancing production of new foodstuffs and by developing stock breeding, fishing, and fish-farming. If it is fairly easy to supplement a deficient diet, for instance, through the distribution of dried skim milk, the problem becomes utterly involved because of the introduction of new foodstuffs. Great difficulties stem from certain beliefs and taboos, hence the importance of education.

Health education. The attitude of the population toward progress may vary greatly from one area to another. It implies many important anthropologic and social factors which are often most difficult to distinguish. If once in a while a spraying team meets the so-called "closed-huts" attitude or if a given population refuses examination on religious grounds, for instance, in leprosy case-finding, the teams may also experience great difficulties containing a population eager to receive an injection or treatment of the people of one village may arouse jealousy of a non-treated nearby village.

In order to bring the population not only to understand and to appreciate but, above all, to collaborate in the public health activities undertaken for their benefit, it is necessary to resort to the many techniques of health education. If such activities are well conducted, the results are most gratifying as evidenced by the spontaneous abandonment of psychologic obstacles which greatly facilitates the work of the health services. Moreover, health education assures more far-reaching and enduring results.

Health education activities, therefore, find their choicest application in those fields in which results are slow and arduous. Health education does not only strive to give people the means to improve their living but also to teach them the "art of living."

The WHO sponsored Health Education of the Public Seminar which took place in Dakar (French West Africa) in March 1957, gave many participants an opportunity to study the means and resources available in Africa to lessen the conflict between different civilizations and to enable the people of technically still underdeveloped areas to accede to both physical and mental well-being free from anxiety and disease.

Environmental sanitation. In various terri-

tories, it was attempted to reduce the incidence of disease by improving the environment of the communities, largely through a more sanitary water supply and the provision of latrine buildings. These examples prove that even with limited financial means, rural living conditions can be greatly improved.

The WHO sponsored Environmental Sanitation Seminar, which took place in Ibadan (Nigeria) in December 1955, enabled participants to exchange views and to define a program in this vast and promising field. Developments are already important, but much is still to be done and governments are extremely interested.

COORDINATION OF TECHNICS—OTHER TRENDS

As will be easily understood from this brief outline, any efforts undertaken in any one of the above fields or, preferably in every one simultaneously, require collaboration of specialists from fields other than the health services: education, rural engineering, agriculture, stock farming, and so forth. Whatever field on which the governments bring the brunt of their public health efforts to bear requires full collaboration between competent and specialist personnel in a field that may sometimes be very remote from the purely medical field.

Among the other trends of public health in Africa are health statistics, mental health, and certain aspects of atomic energy utilization.

Health statistics are a necessity. With the growing expansion of administrative and economic structures in the so-called underdeveloped countries, the need for basic statistics becomes imperative, for they alone assure sound planning for public health problems. The Vital and Health Statistics Seminar, which was held in Brazzaville in November 1956 under the joint auspices of WHO and CCTA, enabled a summing up of the situation in Africa and a definition of future trends.

Mental health is undoubtedly growing in importance in Africa. This is a natural evolution, similar to that observed today in the highly developed countries. In 1958, WHO therefore proposes to call upon a number of specialists in this field to initiate the first seminar on mental health in Africa.

Peaceful utilization of atomic energy becomes more and more generalized in medicine, agriculture, and industry. In particular use are radio isotopes, which find their application both in diagnosis and treatment of diseases and in medical and biologic research, such as radioactive marking for the study of vector behavior in flies, mosquitoes, and so forth. The use of radio-

isotopes automatically brings with it the problem of protection from radiation. Research workers wishing to acquaint themselves with the different aspects of this new science can do so under the WHO fellowship program.

In Africa, the individual is inevitably conditioned by his environment—climate, environmental hygiene, and water supply—his nutrition—shortage of proteins and weaning problems—and his degree of evolution—illiteracy, beliefs and superstitions. It is even more inevitable that these factors also have a major influence on his physical and mental health.

Therefore, preventive measures in the field of public health should duly take into account these three factors, which are so important and which cannot be dissociated.

From the onset of its activities in Africa, WHO has endeavored to assist governments requesting international assistance to solve their problems. This assistance may consist in the organization of training courses or the awarding of fellowships. The latter represents one of the most important aspects of the WHO assistance program throughout Africa. First, this is true because the beneficiaries come from every country and territory of the region; also, because the study program includes all the problems of public health from communicable diseases to anesthesiology and from public health administration to insect resistance and the use of radioisotopes. Faithfully reflecting the trends of a health policy not only African but world-wide, at least with regard to the technically less developed countries, the WHO fellowship program is chiefly devoted to the organization and development of health services according to present trends (53 per cent). The remainder of the program mainly covers the control of communicable diseases. The fellowship program is by far the best means of reinforcing public health services. It is also a vivid illustration of international cooperation, for it not only enables the fellows to perfect their knowledge abroad but also brings specialists from other continents to study the problems of Africa and to take advantage of the experience gained in this continent. Moreover, the fellowship program also enables countries and territories of Africa to exchange specialists with other continents. By the end of 1957, the WHO Regional Office for Africa had awarded over 500 fellowships in all fields. In 1955 alone, fellowships allocated represented fifty-seven years of study.

Cooperation with other international agencies, such as UNICEF, FAO, CCTA, and ICA has helped immensely to develop better health in Africa.

Public Health in the Western Pacific

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THE WESTERN PACIFIC REGION embraces a territory which covers 100° of latitude equally on both sides of the equator and extends at its widest part from 100° west longitude to 120° east longitude. The countries and territories encompassed by this geographic division include Australia (and its non-self-governing territories), Brunei, Cambodia, China (Taiwan), the Federation of Malaya, Hong Kong, Japan, Korea, Laos, Macau, New Zealand (and its island territories), North Borneo, the Philippines, Sarawak, Singapore, Timor, Viet-Nam, West New Guinea, the French and British territories in the central Pacific area, and the United States territories of American Samoa, Guam, and the Pacific Islands Trust Territory.

The Region embraces a variety of peoples with different languages, customs, religions, and cultural backgrounds and widely diverging degrees of progress because of the varying degrees of economic, cultural, and social development of the countries themselves. When the WHO Regional Office for the Western Pacific was formally established in 1951, it was faced, therefore, with a wide variation in the standards of public health development. In some countries, health services were firmly established. In others, modern concepts of health were just beginning to be accepted, while, in the majority, emphasis had been placed on curative rather than preventive medicine.

The first task of the organization was to determine the most urgent needs of the Region as a whole, a task which in the initial stage was not always easy in view of the lack of basic data

available. In the early days, assistance to governments principally took the form of programs aimed at the control of communicable diseases. However, the basic aim behind all programs of assistance—the need to strengthen national health services—was never lost sight of, and education and training facilities have been gradually intensified with a view to combating the shortage of trained medical, nursing, and auxiliary personnel which hampers the development of health services and has a deterrent effect on program implementation. The approach to work in this field has been fluid, and the type of assistance offered has been adjusted to the particular needs and existing resources of the countries and territories in the area. Particular emphasis has been placed on training within the Region, and Australia and New Zealand have played an important role in this aspect of the program, as they are able to provide most of the training facilities required by member governments. The regional program of education and training is not, however, limited to the award of fellowships. In Cambodia and Fiji, for instance, where special categories of subprofessional health workers are trained, WHO has assisted the governments in raising the level of teaching activities through the assignment of lecturers. In Singapore, the University has been strengthened through the assignment of lecturers in different fields of activity, while, in the Philippines, a very successful exchange program has taken place between the University of the Philippines and the Johns Hopkins School of Hygiene and Public Health, which has also been supported by the Rockefeller Foundation. Inter-country seminars have been organized in the fields of environmental sanitation, nursing, venereal-disease control, and health education, and recent conferences included one

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on social and preventive medicine, which was attended by the deans and professors of universities in the region, and a public health conference and study tour visited Japan and China (Taiwan). Such intercountry programs have done much to develop kinship among health officials in the region. Where before each country worked in seclusion, there is now an ever-growing understanding of the problems which exist in the different countries. There is a gradual outflow and intake of scientific information, knowledge is being pooled and made available to all, and experiences are being shared.

Among the earliest activities of the Regional Office directed toward the control of communicable diseases were those undertaken in the fields of malaria, yaws, and tuberculosis. A highlight of the continuing fight against malaria is the expansion of national control programs into malaria eradication campaigns. Technical assistance has been provided to most countries in the Region, and, at present, WHO advisory teams are assisting the governments of Cambodia, North Borneo, and Sarawak. An example of an effective malaria eradication program is to be found in Taiwan, where recent assessment of the program showed that malaria transmission had been interrupted in most parts of the island. In 1951, before the program started, there were 1,200,000 cases of malaria, resulting in 12,000 deaths; in 1956, four years after the campaign started, there were only 492 cases with no deaths reported. In the Philippines, malaria has also ceased to be a major public health problem in many of the former hyperendemic areas, and efforts are now aimed at eradication of the disease. There is no doubt that the work done in this field has had a tangible effect not only on the health of the people but on the economic development in many countries in the Region.

Yaws, which has persisted in a number of countries over the years and which is a major public health problem in some areas, is being systematically attacked. Yaws endemic areas are being drawn into a region-wide program. Eight governments have been stimulated to establish yaws control programs with assistance from WHO and UNICEF, and several governments of island territories have undertaken yaws projects on their own.

A significant trend, which WHO has encouraged, is the increasing emphasis on over-all tuberculosis control programs in which BCG will be an integral part. Many countries now accept the concept of tuberculosis as a public health and not a clinical problem. With the award of fellowships to train medical officers and nurses,

tuberculosis control services are being improved, while modes of execution, methods, supplies and equipment, and recording of results are being standardized.

The incorporation of health education in many WHO-assisted projects has been a major development which has helped to shape a new philosophy of health among the peoples of the Region, and countries are now showing increasing interest in this phase of public health work. In the schistosomiasis control project in Leyte, Philippines, the emphasis given to health education and the importance attached to community participation has done much to establish a firm foundation for health work in the local population.

Diseases susceptible to control by known environmental sanitation technics still constitute a major problem. Every effort has therefore been made to stimulate governments in defining existing sanitation problems and in formulating short- and long-range plans for the incorporation of environmental sanitation in their health activities. In China (Taiwan), Japan, and the Philippines, pilot composting plants have been established, and in an area where unsafe human fertilizer is a menace to public health, this may yet prove to be one very important contribution toward the improvement of public health.

The provision of nursing services was another problem which had to be faced by governments in planning the reconstruction and expansion of health services, as, in many countries, effective services could not be established until professionally trained nurses, midwives, auxiliary nursing, and midwifery personnel were available. Assistance in this field has been given to almost every country and territory in the Western Pacific. New programs in basic nursing have been established; the entrance requirements in schools of nursing have been made higher; and teaching methods have been improved and nursing education administration strengthened.

The need for improvement in the field of maternal and child health is very real in many parts of the Region, especially in countries where a high proportion of births is still attended by untrained persons. In some countries, assistance was required in dealing with specialized programs, while, in others, the first objective was to improve the situation as far as maternal and child health mortality was concerned. WHO has aided the governments of Cambodia, China (Taiwan), the Federation of Malaya, Japan, the Philippines, and Viet-Nam by providing specialist advisers, doctors, nurses, or midwives who have been assigned for periods varying from a

few weeks to several years. There are still many needs unanswered. More well-trained pediatricians are urgently needed; there is a dearth of maternal and child health administrative units at the national level; and nutritional problems receive insufficient attention. However, a number of major problems are gradually being overcome, and slow but steady progress is being made.

The evaluation of projects has become an important regional activity within the last year. All WHO-assisted projects are reviewed at regular intervals in order to assess the progress made and to decide whether a redefinition of the program is required as a result of the developments which have taken place. Such evaluations also form the basis for expansion of existing projects and the introduction of new ones. Evaluation reports on completed projects are, provided the

government concerned agrees, distributed to other member governments in the Region, in order that all may benefit from the experience gained.

Although work in the Western Pacific Region covers many other fields of activity, it is only possible to mention some of the major problems which are receiving attention. Assistance is still required in almost every field of public health and much remains to be done. However, during the past years, a common denominator has developed among countries in the Region, that is, an increased awareness of the need for health work, and the acceptance by all that "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." This is a considerable step forward in the fight to improve the health of the peoples of the world.

Nine Years in the Regional Office of Southeast Asia

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THE REGIONAL OFFICE for Southeast Asia, the first Regional Office to be established by WHO, was started in October 1948 with the first session of its Regional Committee in New Delhi. The original member states were Afghanistan, Burma, Ceylon, India, Thailand, and 2 metropolitan powers — France and Portugal — in respect of their territories of Pondicherry and Goa. Later, Indonesia, Nepal, and the United Kingdom joined in respect of the Maldives Islands, making a total of 10 member states with a population of about 500 million.

All of the countries represented in the Regional Committee were predominantly rural. Eighty per cent of the population lived in rural areas with extremely low living standards, often bordering on almost bare subsistence. Public health services in most of the countries in the Region were poor in the few urban centers and

were practically nonexistent in the rural areas.

Communicable diseases caused by widespread unsanitary environment were prevalent. Malaria was claiming around 100 million victims each year, with about 1 million deaths. Also, serious malnutrition was widespread, and the rate of maternal and infant deaths was alarmingly high. The health services were biased toward clinical medicine, and there was an acute shortage of technical personnel and essential resources.

Except for a few small areas, this was the general picture in this Region.

The expansion of basic public health services for these large populations was the responsibility of the respective governments, and tremendous resources were required.

WHO assistance in this Herculean task had to be largely promotional and catalytic in nature. Accordingly, a start was made with immediate short-term programs, and the major WHO programs during the first two to three years consisted of providing international teams, with some supplies, to demonstrate the control of ma-

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laria, tuberculosis, venereal diseases, yaws, and filariasis. These teams advised and guided the work of national teams whom they trained to take over the work after withdrawal of the WHO staff.

Pilot activities were started almost simultaneously toward positive health. A beginning was made with programs for improving maternal and child health, which also took the form of demonstration and training projects. From the outset, the training of counterpart physicians received major attention. Nurses' training started very early. Even in 1949, 7 nurses were working with WHO demonstration teams, and soon afterward auxiliary staffs and other technicians were trained. The emphasis, however, in the earlier years, remained on training local personnel to work with the WHO staff in particular projects in small well-defined areas.

These and other field programs developed very rapidly. The year 1949 saw 16 WHO-assisted projects operated by a field staff of about 25 at a cost of about \$340,000. In 1952, the program jumped to an estimated expenditure of over \$4,000,000, including over \$2,500,000 under "Other Extra-Budgetary Funds," which came largely as supplies from UNICEF. It covered 55 projects and utilized a field staff of about 125. In 1956, about 120 projects were undertaken with a field staff of 143 and a field budget of \$4,695,419, including \$1,902,866 under "Other Extra-Budgetary Funds." The number of fellowships, including those financed by UNICEF funds, also rose from 46 in 1949 to 69 in 1952 and to 101 in 1956.

Altogether, in the first nine years, WHO in Southeast Asia has assisted with 12 malaria control projects, 10 projects for the control of venereal diseases and yaws, 21 for the control of tuberculosis (including BCG vaccination), 21 for the promotion of maternal and child health (frequently combined with the training of nurses), and with 24 additional nursing projects, as well as with numerous programs in other fields.

The shortage of equipment and supplies formed a major obstacle, but UNICEF joined hands with the regional office from the very beginning by providing much-needed supplies and equipment for the demonstration and training projects. Major achievements of WHO and UNICEF were in the BCG campaigns against tuberculosis, yaws programs, maternal and child health projects, and assistance to hundreds of rural health centers as well as the joint development of a penicillin plant and a DDT plant in India.

From 1952 onward, as a result of experience in the field, it became clear that the control of communicable diseases needed to be developed

by means of nation-wide mass attacks, and demonstration and training projects gradually gave place to mass programs, such as those for BCG vaccination, malaria control, and yaws control, in all of which WHO assisted the nation-wide efforts of the local health administrations.

By the middle of 1957, of 450 million people exposed to malaria, 200 million had been protected. In the BCG campaign against tuberculosis, 112 million people had been tested and 38 million vaccinated.

In regard to yaws, by the end of 1956, of some 77 million persons living in endemic areas, 37 million had been examined and 5 million treated.

Pilot projects against plague, leprosy, and trachoma were the bases for large campaigns which are also under way.

In some countries, the large-scale national programs for malaria control are on the verge of becoming eradication programs. The same should eventually be possible for yaws. Venereal disease control projects are now being carried on without international personnel. It is of interest to note that today control of tuberculosis, which is the most serious communicable disease of the Region after malaria, is being attempted through the development of domiciliary and ambulant therapy with modern drugs. The large-scale isolation of individual patients at institutions was found completely beyond the financial and technical resources of the countries in this Region, except in Ceylon. Similarly, in leprosy control, the emphasis has shifted to active case-finding and noninstitutional treatment.

The training of counterpart personnel alone proved insufficient and had to be expanded to assist in training the very large numbers of workers required for mass programs. Simultaneously, the promotion of maternal and child health services led to the need for nurses, midwives, health visitors, and nursing auxiliaries — training for which WHO has given large-scale and increasing assistance through teaching staffs and supplies.

The regional director's annual report in 1953 lists national courses that, with help from the WHO staff, trained about 1,850 nurses, midwives, and nursing auxiliaries during the year. According to his report in 1956, similar courses helped to train 3,700 such workers. Substantial assistance has also been given in developing, promoting, and expanding nursing and midwifery schools as well as in providing adequate field experience for the trainees.

All these expanding programs also needed highly qualified medical personnel in large numbers. The number available was shockingly small; for

example, it is estimated that Afghanistan and Indonesia had 1 doctor for about 60,000 people; India, 1 to 6,000; and Thailand, 1 to 7,000. Because of the scarcity of qualified teachers as well as the expense of modern medical schools, progress in this vital field has remained slow, although there has been steady improvement during the past two to three years.

WHO has assisted by providing professors to set up various departments in medical schools and to train counterpart staffs as well as by furnishing teaching equipment and supplies. Some help has also been given in the preparation and translation of textbooks.

Recently, the regional office has particularly promoted the establishment of full-time departments of preventive medicine and of pediatrics. Owing to the lack of qualified teachers in preventive medicine, a special arrangement was made with the Harvard School of Public Health to train young national teachers in a specially organized public health teachers' course lasting two years. In addition to the assistance given to medical schools, an important project was developed jointly with UNICEF to expand and improve the activities at the All-India Institute of Hygiene and Public Health, Calcutta, to provide training in general public health, maternal and child health, public health nursing, sanitary engineering, and health education.

In the past three years, WHO's role has been directed more and more toward these training programs. In 1956, in addition to training counterpart teams and organizing a very large number of training courses in different subjects, the regional office assisted in conducting 40 refresher courses for about 700 trainees consisting of medical officers, nurses, technicians, sanitarians, and other auxiliary workers.

Emphasis has also been shifting from individual communicable disease control toward meeting the more basic needs of the Region—rural health services, improvements in sanitation, and health education—and toward integrating specialized programs into the general public health services. During the same period, some countries of the Region, particularly India, have undertaken very large national community development programs. Assistance is being increasingly provided to strengthen these projects, especially through the development of rural health centers.

Governments recognize the need for reliable vital and health statistics in the Region, for, even today, 3 out of the 7 countries have no records of birth and death rates. WHO has given some assistance during the last few years to efforts to

improve and also develop statistical services.

As the awareness of positive health has increased among the populations and large amounts of international and bilateral assistance have become available, governments are being compelled to expand their health services to the utmost of their total resources. Quantity is very often provided at the sacrifice of some quality, and the lack of adequate supervision at all levels has become a matter of grave concern.

Apart from WHO and UNICEF, other important organizations have been working in the field of health in Southeast Asia. Through the bilateral program of the U.S.A., much public health support has also been made available to this Region, of which the assistance given to malaria control and, more recently, malaria eradication is the most noteworthy. A large number of fellowships and a variety of experts as well as some equipment and supplies have been provided through Colombo Plan arrangements. The Rockefeller Foundation and the Ford Foundation have also substantially aided in medical education and training. With all these organizations, the regional office has worked very closely.

The most important achievements in the first nine years of WHO assistance may be summarized as follows:

1. Expansion of programs for the control of major communicable diseases, their development into mass programs, and their gradual integration into the concurrently expanding general public health services.

2. Tremendous strides in training personnel, especially nursing personnel and health auxiliaries.

3. Emphasis placed on pediatrics, especially pediatric education, as well as the promotion of maternal and child health services, and—what is more important—the integration of these specialized services into general public health.

4. Improvement of medical education generally.

5. The establishment of departments of public health and preventive medicine and the integration of the teaching of preventive medicine into the general curricula of medical schools.

6. Active promotion of vital and health statistics.

7. Promotion of health education by training key personnel and the demonstration of field techniques at the country level.

Perhaps the most important achievement of all, however, has been the fact that the governments in this Region now look upon WHO as their natural collaborator and partner in all efforts to improve the national health services.

Public Health in the Eastern Mediterranean

A. H. TABA, M.D.

Alexandria, Egypt

THE EASTERN MEDITERRANEAN REGION of the World Health Organization, which extends from East Pakistan in the East to Tunisia in the West and from Syria and Iran in the North to Ethiopia and Sudan in the South, probably contains about 180,000,000 people. It has, since the beginning of time, been one of the major crossroads of humanity. Remnants from the earliest known civilizations are still being uncovered in this Region. Monotheistic religion came from this area, and one has only to mention the art of writing and the science of mathematics to indicate how much the world is indebted to the Eastern Mediterranean Region.

For over one thousand years, a large section of this Region was politically unified under the Persian, Macedonian, and Roman empires. During the first six centuries after Christ, wide areas were influenced by Christianity. Since that time, the major influence has been Islamism, which is, today, the greatest single factor in the gradual unity of the Region. Probably 85 per cent of the population are Moslems, about 5 per cent are Christians of various denominations, and about 2 per cent are Jewish.

As a crossroad in world shipping, the area has been greatly influenced by western civilization.

The more well-to-do part of the population has much the same birth and death rates, life expectancy, and standards of housing and education as do the population of the western countries, but a large number of the people in the Region continue to live in very much the same circumstances as they did centuries ago.

Approximately 90 per cent of the entire Region is desert, and the difference between town, country, and desert is very much more marked than it is in other parts of the world. The desert is not an entirely uninhabited waste but is sparsely populated with nomadic groups who use it as a grazing area for their flocks of sheep and goats.

The urban population varies greatly from country to country. It is estimated to be under 10 per cent of the total population in the Sudan and the Arabian Peninsula, about 40 per cent of the population in Lebanon, and perhaps 50 per cent of the population in Israel. The nomadic groups make up approximately one-third of the population in the Arabian Peninsula but form a very small percentage of the population in Egypt and Lebanon.

For the most part, statistical data for this Region are inadequate and usually not reliable. During the last ten years, the birth and death rates in the area have been rather high. The latter, however, have begun to decrease. The rates of natural increase in population are going up, partly because of the decrease in general mortality, particularly in infant and child mortality, but also because of the increasing survival rates.

The main achievement of modern public health methods in this Region has been in the control of epidemic diseases. The majority of the countries have facilities for dealing with epidemics, should they appear. However, the control of communicable disease still constitutes a major field of WHO assistance to the countries of the Region. The village populations in most areas are, however, still burdened by a combination of such chronic diseases as trachoma, bilharziasis, venereal disease, malaria, and hookworm.

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Malaria eradication programs are being carried out in Iran, Iraq, Lebanon, and Syria, with similar projects under way in Egypt, Israel, and Jordan. The chief handicap in these programs is still the lack of adequate administrative machinery in some areas which hinders effective action in the control of eradication procedures.

It is inevitable that emphasis must continue to be placed on the control of these diseases.

More information is becoming available on methods for mass control of some of the diseases. Pilot projects for the treatment of communicable eye disease have been carried out in Tunisia and Egypt, and mass campaigns using the procedures developed are beginning. Similar pilot projects in the treatment of bilharziasis and the control of the snail vectors are being carried on in Iraq, Sudan, and Egypt. Methods for the prevention of infestation of the snails in new irrigated areas are receiving special attention.

In the Middle East, there is a basic and urgent need not only for more trained doctors, nurses, and public health officers but also for the development of a medical and health corps dedicated to rural services. The education and training programs, therefore, have formed an important element in the WHO activities in the Region during the past years. Such programs as the training school for health assistants at Gondar, Ethiopia, and the training programs for auxiliary nurses in operation at Bengazi and Tripolitania in Libya will provide health personnel with elementary public health training able to meet the specific needs of areas in which they will serve.

The need for more adequately trained personnel in all of the countries cannot be overemphasized.

Much effort and considerable success can be reported on assistance to the member states in developing their own institutions for the education and training of all types and levels of health personnel—professional, subprofessional, and auxiliary. The consequent trained personnel available for expanding public health efforts is an essential support factor and, in most cases, a primary limiting factor. A great deal of aid has been provided by WHO to assist in the organization of the professional education of public health personnel. Professors of sanitary engineering at the University of Alexandria, at the Technion in Haifa, and at the College of Engineering in Baghdad and teachers in industrial hygiene and teaching consultants in special subjects assisting in the organization of a department of occupational hygiene at the new High Institute of Public Health in Alexandria are all

carrying out their work under WHO sponsorship. In Beirut, Lebanon, a professor of virology in the medical faculty of the French University and a professor of health education in the School of Public Health at the American University are EMRO appointments, as are a lecturer in parasitology in Baghdad and a professor of physiology at the Medical School in Karachi. In Ethiopia and Israel, surveys have been carried out and projects involving special consultants on medical education have been undertaken.

Because of the pressing need for professionally trained personnel, the fellowship program of WHO has received special attention. Approximately 10 per cent of our total expenditures have been for fellowship assistance.

A special item of interest in this program is the number of undergraduate fellowships for professional training in medicine, pharmacy, and nursing that have been awarded. This is highly important in assisting to build a cadre of professional health workers, physicians, pharmacists, and nurses in countries which do not have many such professionally trained persons among their citizens and which, as yet, do not have the training institutions. Action has been taken to stimulate similar undergraduate training for engineers, in order to increase the cadre of qualified sanitary engineers who are so necessary to a technically sound environmental sanitation program.

There has been a growing awareness in the countries of the Region of the importance of public health programs as an integral part of the national planning. Assistance in developing long-term plans and strengthening the national health administrations to carry out these plans is a major function of WHO. This is being done not only on a central and organizational basis at the Ministry of Health level but also in the field of provincial health administration and rural health. The development of programs for the purpose of distributing and improving health services to the rural areas has increased accordingly during the last five years.

Three main trends, therefore, can be seen in the public health activities in the Eastern Mediterranean Region. The governments, with the assistance of the international health agencies are: (1) continuing to improve their services for the control or eradication of the prominent debilitating communicable diseases; (2) strengthening the national and local administrations and organizations for providing health services; and (3) extending and improving educational facilities for medical and related personnel.

Public Health in Europe

PAUL J. J. VAN DE CALSEYDE, M.D.

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TEN YEARS AGO, Europe was still struggling to overcome the immediate effects of the war. Infant mortality was high; hospitals and teaching institutions were in ruins. Many countries were suffering from an acute shortage of health personnel. The normal flow of information across national boundaries had virtually ceased, and years were to elapse before the gaps in medical knowledge would be filled in. Europe, which had at one time been in the lead in communicable diseases, psychiatry, radiology, and surgery, for example, was now lagging far behind.

Many agencies, including WHO, threw their weight into the battle to overcome the emergency. Supplies and equipment, medical literature, teaching missions, and fellowships to health workers for study abroad began to make good the deficiencies. A very promising start was made on international cooperation for health throughout the Region.

However, it was not long before disruptive forces were again to slow up international communication. Not until last year did health work in the Region as a whole receive fresh stimulus when the USSR, Poland, Bulgaria, Roumania, and Albania, to be followed this year by Czechoslovakia, again took up their work with WHO.

In the meantime, much had happened. Infant death rates had dropped to below prewar levels; some countries had achieved lower national rates than any in the world. Tuberculosis death rates had decreased sharply, in some countries by 40 to 60 per cent over a period of five years. Bovine tuberculosis was eradicated in a few countries;

in others, eradication was in sight. The 5-nation Venereal Disease Commission of the Rhine, set up to combat infection among the boatmen and their families on the river, was disbanded at the end of 1953 because the number of new cases occurring among this population of about 50,000 had become negligible. There were additional territories in which the number of annual deaths from diphtheria had fallen to zero or could be counted on one hand. A telling attack had been made on trachoma, and mass campaigns against the disease were gathering momentum in countries bordering the Mediterranean. Public health services had been consolidated in all countries in the Region, frequently with assistance from UNICEF for mother and child health services.

Methods of international service had also changed. With the passing of the postwar health emergency and the necessity for relief work to individual countries, efforts could be concentrated on public health problems common to a number of countries. The provision of supplies and materials was no longer a prominent feature of WHO's activities; its services to individual countries were largely concentrated on professional education. Inter-country programs, in which the resources of several countries are pooled, had become characteristic of WHO's work in Europe. This meant a considerable saving of money and personnel, since, by this method, it became possible to achieve results simultaneously in several countries. Inter-country meetings also provide opportunity for bringing members of related professions together who should form a team at home but too often work in magnificent isolation.

The renewed participation of the countries just mentioned has not been under way for long.

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Two of these member states have already acted as hosts to some of our intercountry meetings. A small group of specialists met in Moscow last year to discuss public health laboratory services in Europe, and a large seminar attended by physicians and veterinarians from 23 countries convened in Warsaw for discussions and demonstrations on prominent zoonoses and veterinary public health. Later this year, public health administrators and malariologists from countries in southeastern Europe will meet in Bucharest in order to coordinate national campaigns for malaria eradication. It is the third year that such a conference has been held, and, according to present plans, three to five years should see the end of malaria transmission in this area. Next year, the Roumanian government is to act as host to the Regional Committee for Europe. The last twelve months, which also saw the Regional Office for Europe move to its permanent home in Copenhagen, have thus been highly significant in furthering international health work throughout the Region and augur well for the future.

Europe today would normally be regarded as a region with some differences between countries in health problems and health services but with a similar high level of development, particularly as regards the more industrialized countries. Its health problems may well appear insignificant beside the high infant mortality, the epidemic scourges of yaws and malaria, or the low standards of environmental sanitation in some parts of the world. Certainly there are differences, but no country in the world, whatever its development, is without important health problems. Easily the most important in Europe is mental illness. Taking England and Wales as an example, we find that 40 per cent of the available hospital beds are occupied by mentally ill or deficient patients. In the region as a whole, the incidence of mental illness appears fairly uniform throughout, though countries with less extensive services show lower prevalence rates. The lack of personnel—child psychiatrists and psychiatric nurses, for example—is one of the obstacles to development. At the same time, medical and public health practice need to be reorientated toward preventing mental illness, and mental health must be included in the training programs of nonmedical workers, such as social workers, teachers, and juvenile court judges, who can make an important contribution in this field. In most countries, after-care services for patients discharged from mental hospitals are inadequate. Again, much more could be done to ensure mentally subnormal persons a place in society.

The Regional Office has concerned itself with

these various questions, chiefly through intercountry meetings and through its fellowship program. In addition to concentrating on the mental health of the child, it has worked on problems of the adult population, notably alcoholism. It was also able to contribute to work on the mental health of refugees, of which there are large numbers in Europe.

Some further examples will illustrate the contribution an international agency can make to health work among highly developed countries.

As infant mortality falls, deaths shortly before, during, and after birth figure more prominently in the annals of wasted life. Perinatal mortality has shown very little change in recent years. In many countries, considerably more than half of the children who die in their first year, die in the first week after birth, and almost as many infants are stillborn as die during the entire first year of life. While improved perinatal as well as delivery and newborn care will save many lives, a very large proportion of perinatal deaths occur from causes against which specific counteraction cannot readily be taken as yet. Two intercountry meetings studied perinatal mortality and found that intensified research is needed in which primarily the obstetrician, the pediatrician, and the pathologist should participate. The office is now engaged in coordinating perinatal research in The Netherlands, Ireland, and Sweden.

The intercountry approach has also been put to use in combating childhood accidents, in developing industrial health services and public health laboratory services, in training virologists, and in studying the educational needs of the nursing profession. Many developments in health education can be traced to a European conference convened in 1953. The present rapid expansion of services for the rehabilitation of handicapped children sprang from a number of intercountry programs organized during and since 1950. National schemes for handicapped children were subsequently supported in several countries by WHO and UNICEF.

One of the earliest programs initiated by WHO in Europe was a series of meetings designed to bring leading sanitary engineers and public health officers together on common problems. There have now been five meetings, focused usually on one major topic. Among topics which have been studied, I would mention the pressing European problem of ground and surface water pollution now that pure water is increasingly needed for domestic and industrial uses. A discussion on sewage disposal from isolated dwellings brought out some useful suggested standards for the design and operation

of septic tanks. In an effort to improve professional communication, an international glossary of sanitary engineering terms was published. A great deal of effort was also devoted to the training and use of sanitary engineers, and the region has undertaken a study of water standards and water quality as part of a world-wide approach to this subject. Recently, a large conference discussed air pollution, which must also be counted a most pressing problem in Europe.

With the rapid development of the peaceful uses of atomic energy and its by-products in Europe, personnel trained in health physics is increasingly needed. In arranging training courses for engineers, chemists, and public health administrators, the Regional Office has been fortunate in being able to work with the Oak Ridge National Laboratory, Tennessee; the United Kingdom Atomic Energy Authority, Harwell, England; the Centre d'Etudes Nucléaires, Paris; and the Centre d'Etudes pour les Applications de l'Energie Nucléaire, Mol, Belgium.

It is impossible to foresee the full effects of the peaceful uses of nuclear energy in the next decade, but social change will certainly be stimulated and new problems may well be brought into man's social and mental life. In the coming years, Europe and its regional health office will need to take a wide view of these changes.

Work in chronic diseases and the public health aspects of the aging populations is increasing in

Europe. At present, the Regional Office is attempting to sum up the many developments in public health and medical care and to determine how the accumulated knowledge on old age can best be put to use. For the study of cardiac and vascular diseases, some internationalization of research, particularly epidemiologic research, is considered necessary. A better understanding of the role of nutrition in the onset of these diseases may lead to far-reaching changes. An obvious application would be, for example, in hospital dietetics.

The hospital itself is today in a period of transition. From a center for sheltered medical care, it is becoming a social unit with a new relation to the community at large and is fulfilling new functions within the medical profession. WHO undoubtedly has a role to play here in bringing members of related disciplines together internationally and in making training available, particularly for medically qualified hospital administrators.

The entire program of WHO in Europe is much concerned with education and training, primarily through an international fellowship scheme in which, to date, over 3,200 awards have been made. It is largely through individual fellowships and the many training courses WHO has organized in the Region that the more exploratory or theoretic part of our work is consolidated and translated into practice.

International Health in the Americas

Ten Significant Years

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AN OUTSTANDING DEVELOPMENT of the past decade in international health in the Americas is the unification of the programs of the Pan

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American and World Organizations. During the life of the Health Section of the League of Nations, its activities were independent of and to some extent competing with those of the Pan American Sanitary Bureau, the traditional health organization of the Americas. The Constitution of the World Health Organization, drawn up in 1946, fortunately provides for regional organizations in different geographic areas. In the interim before this constitution became operative

in 1948, the twelfth Pan American Sanitary Conference, held in Caracas in 1947, adopted a new constitution for the Pan American Sanitary Organization, especially designed to permit the PASO to serve as the regional organization of WHO for the Western Hemisphere. The Constitution of 1947 gives breadth and full continental scope to Pan American health activities, previously limited to the 21 American Republics by the Pan American Sanitary Code of 1924.

Under this constitution, France, The Netherlands, and the United Kingdom became active participants in the PASO, and agreements were signed with WHO in 1949 and with the Organization of American States in 1950, whereby the PASO serves as the regional organization of WHO and is recognized as a Specialized Organization of the OAS.

The tenth anniversary of the Constitution of the PASO was commemorated in September 1957 by a special session of the Directing Council in the Hall of the Americas at the Pan American Union in Washington. The secretary-general of the OAS and the director-general of WHO joined the director of the PASB at the commemorative session in emphasizing the importance of this unification of international health activities in the Americas in a single program.

No one could have foreseen a decade ago how indispensable the unity of the international health program would become with the unanticipated rehabilitation of the concept of the eradication of communicable diseases.

The initiation of regional eradication programs in the Americas against (1) the *Aedes aegypti* mosquito, the urban vector of yellow fever in 1947, (2) smallpox in 1950, (3) yaws in 1950, and (4) malaria in 1950-1954, was followed by adoption of the world eradication of malaria in 1955 as an official program of WHO, UNICEF, and ICA (International Cooperation Administration of the United States Department of State). Undoubtedly this is the most significant milestone in international health since 1902, when organized international cooperation began.

When Pasteur destroyed the concept of spontaneous generation of infectious disease, the concept of eradication of the causative agents of communicable diseases became inevitable. Etymologically, the word "eradicate" comes from the Latin and means to take out by the roots—to extirpate. Prior to Pasteur, medicine used the verb, "eradicate," and the noun, "eradication," in relation to disease in the individual patient. Today the term "disease eradication" means the complete elimination of all sources of infection or infestation so that, even without all preventive

measures, the disease does not reappear. In 1888, Chapin, commenting on Koch's discovery of the tubercle bacillus, boldly declared, "There is no theoretical reason why a purely contagious disease like tuberculosis cannot be exterminated. If we can prevent the spread of contagion at all, we can prevent it entirely." Similar visions of liberating the human race from malaria, yellow fever, hookworm, and other diseases have arisen as the mechanisms of transmission of these diseases have been found and methods of prevention devised.

Ronald Ross showed mathematically that malaria could be eradicated under certain conditions. General Gorgas believed that yellow fever could be "eradicited from the face of the earth within a reasonable time and at a reasonable cost"; and the Rockefeller Sanitary Commission, dedicated to the battle against hookworm disease in the USA, carried the term "eradication" in its title.

Disappointment and frustration were the lot of the early enthusiasts who dreamed of disease eradication. Tuberculosis receded slowly in some countries, not at all in others; the prevention of malaria proved too costly for rural areas; the campaign for the eradication of yellow fever appeared promising for some years but was doomed to failure from its inception because of an unrecognized reservoir of infection in forest animals; and, although hookworm disease declined in many countries, hookworm infestation remained widespread.

The difficulties and delays in eradication led a whole generation of health workers to ignore the possibilities of eradication programs and to devote themselves to general health programs with emphasis on the gradual concomitant reduction of the incidence of all preventable diseases.

The rehabilitation of the "eradication" concept in public health has been gradual over the past twenty-five years. In 1933, it was shown that the *Aedes aegypti* mosquito had been eradicated from the principal ports of Brazil. Half a century after Chapin's youthful enthusiasm, Frost, reviewing tuberculosis data in the United States, concluded in 1936 that "Under present conditions of human resistance and environment, the tubercle bacillus is losing ground and the eventual eradication of tuberculosis requires only that the present balance against it be maintained."

The eradication of *Anopheles gambiae* in Brazil in 1939 and 1940, at a time when this most dangerous of African vectors of malaria had become a serious threat to tropical and subtrop-

ical America, served to dramatize the possibilities of the eradication technic.

The eradication of malaria as a disease became practicable when it was found that DDT and other residual insecticides can effectively block the transmission of malaria, without the eradication of the mosquito vector, and that the interruption of transmission is followed by the spontaneous disappearance of the disease within a few years.

When it was demonstrated that a single dose of penicillin could make an infectious case of syphilis or yaws noninfectious, the eradication of these diseases became an administrative rather than a technical problem.

The production of desiccated smallpox vaccine, viable for long periods at tropical temperatures, has greatly strengthened the position of those who have so long insisted that smallpox can be eradicated.

Even in the case of tuberculosis, the introduction of modern therapeutic measures has caused such a remarkable drop, first, in death rates and, now, in incidence, that Chapin's dream of eradication is shaping into reality.

Today it is apparent that Chapin's dictum, "If we can prevent the spread of contagion at all, we can prevent it entirely," cannot be efficiently applied to individual communities or limited areas. The full rewards of eradication come only when the threat of reinfection or reinfestation has been eliminated. Not only must eradication be complete within each country, but it must be carried out on an ever-expanding front across the frontiers of neighboring countries on a regional and, eventually, a world-wide scale. Eradication, when possible, is never an easy accomplishment and is often especially difficult in countries in which the particular objective of eradication may not be highly important and, consequently, of little interest to the national health authorities. Eradication is expensive and may well be beyond the financial capacity of some countries, which is an obstacle that must be cleared as part of the solution of a common threat. The funds of many countries must often be pooled in order to develop eradication programs of common interest. Such pooling of government funds follows diverse channels. In the special case of malaria eradication, this is done through the

regular funds of PASO and WHO, the Technical Assistance Fund of the United Nations, UNICEF, the International Cooperation Administration of the USA, and the special malaria eradication funds of the PASO and of WHO.

The stimulation of national eradication programs and the coordination of these programs in regional and, eventually, global programs is a task peculiarly suited to the organizational structure of the PASO and its special relationship with WHO.

None of the official continental eradication programs of the PASO is complete, but sufficient progress has been made in each to guarantee final success. The *Aedes aegypti* mosquito has not been found recently in Aruba, Bermuda, Bolivia, Brazil, British Guiana, Chile, Costa Rica, Curaçao, Ecuador, El Salvador, French Guiana, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru, and Uruguay; these areas are probably free of infestation. The PASB is cooperating with the governments of Argentina, Colombia, Cuba, the Dominican Republic, Haiti, Jamaica, Trinidad, and the other islands of the Caribbean in campaigns for the eradication of this urban vector of yellow fever.

Smallpox has apparently not occurred in North and Central America, the islands of the Caribbean, Chile, Panama, or Peru since 1954. In 1957, only 7 political units in South America reported cases of smallpox.

In Haiti, where yaws eradication began in 1950, yaws is at the vanishing point, and a final search for cases is being made as part of a smallpox vaccination program.

Malaria has been eradicated from the United States and Chile and from large areas of Argentina, Peru, and Venezuela. Since 1954, all of the malarious countries of the Americas, with the exception of one, have prepared for the transformation of malaria control programs into malaria eradication projects.

Important as is the emphasis on eradication, the basic program of the PASO and WHO in the Americas is the effort to ensure continued progress in general public health activities in the Americas. This can be accomplished by (1) strengthening the fundamental health services of member governments and (2) expanding education and training facilities for health workers.

The World Health Organization

Ten Years of Progress

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Washington, D.C.

DURING THE PAST TEN YEARS, the World Health Organization has emerged onto the world medical scene as a force of major importance. Its influence reaches farther and penetrates more deeply than does its name. Even physicians whose everyday work is affected in many ways by WHO activities are not yet widely cognizant of its program and its far-reaching influence. It is pertinent, therefore, to examine the many areas of its activities. They represent a highly significant accomplishment in international living.

The activities of WHO can be examined under two major headings: (1) its world-wide technical services and (2) its technical assistance to individual governments. They are different but equally important in the progress of medicine and the progress of mankind.

WORLD-WIDE TECHNICAL SERVICES

International biological standards. The purity and potency of many therapeutic substances can be determined only through biological procedures for which arbitrary standards must be established. Such standards have little meaning unless they are in general use. This requires agreement on an international basis.

The first international biological standard, that for diphtheria antitoxin, was adopted in 1922 by the Health Section of the League of Nations. Nearly 70 standards have now been set by WHO, including those for antibiotics, hormones, vitamins, sera, and toxoids. The preparation, custody, and distribution of standard preparations as the basis for comparative tests is focused in two international centers—Copenhagen and London—with participation by other laboratories throughout the world, including the National Institutes of Health of the Public Health Service.

The international units provided under this

program give physicians the world over assurance that the dosages they prescribe have uniform strength no matter what the source.

The complete list of the international biological standards set by WHO to date is as follows:

IMMUNOLOGIC SUBSTANCES—Antigens: Old tuberculin; Purified protein derivative of avian tuberculin; Purified protein derivative of mammalian tuberculin; Tetanus toxoid; Diphtheria toxoid, plain; Diphtheria toxoid, adsorbed; Schick-test toxin (diphtheria); Cholera antigen (Inaba); Cholera antigen (Ogawa); Cholera vaccine (Inaba); Cholera vaccine (Ogawa); Cardiolipin; Lecithin (beef heart); Lecithin (egg); **Antibodies:** Tetanus antitoxin; Diphtheria antitoxin; Diphtheria antitoxin for flocculation test; Antidysentery serum (Shiga); Gas-gangrene antitoxin (perfringens) (*Clostridium welchii* type A antitoxin); *Clostridium welchii* (perfringens) type B antitoxin; *Clostridium welchii* (perfringens) type D antitoxin; Gas-gangrene antitoxin (*vibrio septique*); Gas-gangrene antitoxin (oedematiens); Gas-gangrene antitoxin (*histolyticus*); Gas-gangrene antitoxin (*Sordelli*); *Staphylococcus a* antitoxin; Scarlet fever *Streptococcus* antitoxin; Swine erysipelas serum (anti-N); Antipneumococcus serum (type 1 and type 2); Anti-Brucella abortus serum; Anti-Q-fever serum; Antirabies serum; Anti-A blood-typing serum; Anti-B blood-typing serum; Antityphoid serum (provisional); Cholera agglutinating serum (Inaba); Cholera agglutinating serum (Ogawa); **Miscellaneous:** Opacity reference preparation.

PHARMACOLOGIC SUBSTANCES—Antibiotics: Penicillin; Penicillin K; Streptomycin; Dihydrostreptomycin; Bacitracin; Chlorotetracycline; Polymyxin B; Oxytetracycline; **Hormones:** Oxytocic, vasopressor, and antidiuretic substances (previously named: posterior pituitary lobe); Prolactin; Thyrotrophin; Corticotrophin (previously named: adrenocorticotrophic hormone); Growth hormone; Serum gonadotrophin; Chorionic gonadotrophin; Insulin; Heparin; **Vitamins, Enzymes:** Vitamin D₂; Hyaluronidase; **Miscellaneous:** Digitalis; Neoarsphenamine; Sulfarsphenamine; Oxophenarsine; Mel B; MSB; Dimercaprol; Prothamine.

International pharmacopoeia. The pharmacologic and related professions recognized long ago the necessity for all countries to use uniform standards and preparations for medicinal agents. The work of achieving uniformity in description and strength of drugs began with the First International Congress of Pharmacy in 1865.

By the time WHO came into existence, some 40 countries had published pharmacopoeias. These showed wide divergencies. Nomenclature

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varied, and proprietary names adopted in countries not bound by patent agreements added to the confusion. This meant that a prescription could be compounded of different drugs in different countries, and that drugs acceptable in one country could be rejected by importers in another because of nonconformance to arbitrary and frequently unrealistic standards. The task before WHO was obvious and urgent.

The pharmaceutical profession and the drug manufacturing industry have actively assisted in the development of a pharmacopoeia which fills the need for an international guide. The first edition of the International Pharmacopoeia appeared in two volumes in 1951 and 1955. It is being widely adopted as a model for national pharmacopoeias, thus helping to assure uniformity of specifications for the same preparation in different countries.

International reference centers. WHO has established international reference centers to facilitate research and testing. Some of these centers prepare, maintain, and disseminate biological standards. Others collect, exchange, and study strains of *Salmonella*, *Shigella*, and *Escherichia* and the viruses of poliomyelitis and influenza. The International Blood Group Reference Laboratory in London types rare blood groups and maintains standard sera for distribution for testing purposes.

International laboratory network. The reference centers are only a part of WHO's network of cooperating laboratories. There are 6 additional regional laboratories which help coordinate research on polio and disseminate information on its prevalence as well as a system of collaborating laboratories widely scattered throughout the world which keep a constant vigil on influenza.

The WHO Influenza Study Program is considered to be an effective weapon in limiting the spread of this disease. It is designed to prevent disastrous pandemics, such as that of 1918 to 1919, by keeping constant world-wide watch for the appearance and spread of influenza and permitting rapid identification of causative virus strains and early production of effective vaccines.

The study program is focused in 2 centers—the World Influenza Center at the National Institute of Medical Research in London and the International Influenza Center for the Americas at the Communicable Disease Center of the Public Health Service in Montgomery, Alabama. Both centers collaborate to get an over-all world picture of influenza. Many national laboratories cooperate with these two international centers.



DR. HYDE

In the Americas, 70 laboratories of state and local health departments, universities, and private organizations cooperate with the International Influenza Center for the Americas. Of these, approximately 60 are in the United States. Fifty-seven centers in 46 other countries cooperate with the World Influenza Center. These cooperating laboratories keep the centers posted on new influenza outbreaks and on the progress of vaccine research. They also send samples of virus strains to the centers for study and identification.

There is also an Influenza Information Center in Washington, D. C., operated for WHO by the Public Health Service to receive and disseminate reports on influenza incidence and strain identification.

While influenza cannot yet be prevented, the world is better armed through WHO to minimize its incidence and effects. The recent epidemic of influenza is an example of this. Through the efforts of WHO and the cooperating laboratories in countries first affected, information on morbidity and mortality as well as on strain types was available to workers in the United States in time to permit the manufacture of ample supplies of a protective vaccine.

In each of WHO's 6 geographic regions, a major laboratory is designated as the WHO Regional Poliomyelitis Laboratory. It coordinates the work of other cooperating laboratories in the region. Through this program, poliomyelitis strains are identified and exchanged, determinations are made of the degree of immunity of populations, and scarce materials needed for tissue culture are procured and distributed. Expert groups meeting under WHO auspices evaluated and reported favorably on the use in the various countries of the Salk and related polio vaccines.

WHO-sponsored programs have also been evaluating the efficacy and production of typhoid, smallpox, diphtheria, pertussis, and tetanus antigens.

International nomenclature. The number of pharmaceutical products in daily medicinal use has expanded rapidly, leading to problems of assuring ready identification of a drug throughout the world. A WHO program advises governments on acceptable generic and nonproprietary names for drugs and asks that these names be protected against use as trademarks. This makes it possible for science, the professions, and industry over the world to use the same common names for drugs with full understanding. The names included must be pronounceable in several languages and must not have been pre-empted by a product already trade-marked in any of the 87 member countries. Thus far, about 200 nonproprietary names have been recommended by WHO and accepted by many countries, including the United States, as the official names for drugs.

Reporting of diseases and compilation of international health statistics are facilitated by use of a standard classification of diseases, injuries, and causes of death developed by WHO.

The problem of reporting health statistics internationally was closely related to the establishment of an international medical nomenclature. Like the problem of a standard nomenclature, the preparation of a uniform and methodical classification of diseases has been the subject of study and discussion for many years. Since the nineteenth century, different groups have attempted with varying degrees of success to arrive at a classification which would make it possible to enter all morbid conditions under a limited number of headings and to supply quantitative information on groups of cases.

Because WHO was charged with promoting development of health statistics throughout the world, it inherited the problem of assisting statisticians in the preparation of a classification system which would have world-wide applicability. The outcome of WHO's efforts is the International Statistical Classification of Diseases, Injuries, and Causes of Death. This work, along with rules for selection of the underlying cause of death and special lists for tabulation of statistics, was published in two volumes in 1950 and 1952. Through this publication, WHO has made international comparability of health statistics possible.

Another method by which WHO attempts to establish a standard language for physicians the

world over is by convening study groups on specific diseases. Two such groups met last year.

A study group on Histologic Definitions of Cancer Types met in June in Oslo to consider organization of an international reference center for the coordination of exchange of histopathologic materials. The group recommended that special laboratories should be asked to hold reference collections of pathologic materials and sections from the cancers in which they are especially competent. These materials would be made available to other institutions on request. Exchange of these materials would help arrive at more precise characterizations of the numerous cancer types.

In October, a group composed of 15 leading heart specialists from 12 countries met in Washington, D. C., to consider the Classification of Atherosclerotic Lesions. The group studied procedures for the processing and examination of specimens, discussed a proposal for establishment of regional centers to study specimens, and discussed procedures to classify experimental degenerative vascular lesions created in the laboratory and their bearing on the classification of atherosclerosis in man.

The group agreed upon standards for the classification of this pathologic process and recommended that studies be made of the relationship between atherosclerotic lesions and mortality on unselected material. They further recommended an international program based on establishment of an international center which will obtain case materials from its own resources, from regional and national centers, and from other collaborating laboratories. When the work of studying and defining the lesions has reached a suitable stage, study sets composed of specimens, slides, and descriptive materials will be made up. This program should contribute measurably to the solution of problems in classification of atherosclerotic lesions and lead to general acceptance of a uniform nomenclature to describe the intensity, type, and time of evolution of lesions.

Epidemic control. World-wide reporting of diseases and vital statistics is another important technical service provided by WHO. By means of an international communications network established in 1948, outbreaks of quarantinable disease in any country are reported to WHO headquarters in Geneva. News of such outbreaks is broadcast to public health authorities in all countries, to ships at sea, and to seaports and airports. Health authorities can immediately apply appropriate quarantine measures to pre-

vent the national and international spread of these diseases.

This world-wide medical intelligence system has become increasingly important as air travel brings the nations of the world closer together.

The International Sanitary Regulations adopted by WHO in 1951 are another service which touches the physician in his everyday practice. The yellow form—International Certificate of Vaccination—which physicians in all parts of the world are asked to complete for persons going abroad is one example of these regulations in action.

Measures to promote the use of uniform quarantine procedures and to ensure world-wide epidemiologic reporting are the outgrowth of the oldest area of international discussion and co-operation in health. Beginning in 1851, a series of international sanitary conferences was held which enabled nations to gradually approach agreement on measures for disease reporting and quarantine. Effective agreement, however, depended upon scientific understanding of the nature of disease and its transmission. By the close of the nineteenth century, scientific knowledge of diseases and of measures for their control had reached a point where it was possible for nations to agree on uniform quarantine measures and epidemiologic reporting.

The first effective comprehensive international sanitary convention was drawn up in 1903 and was amended and supplemented many times. Through WHO, however, there is now a uniform set of international quarantine measures which replaces 13 earlier agreements. The regulations set forth the maximum restrictions which may be imposed. In so doing, they are designed to facilitate rather than hinder the flow of commerce and still provide essential protection.

Publications. WHO publishes several series of documents which are of interest to everyone in the health field. The principal scientific periodical of WHO is the *Bulletin* which contains original articles on public health subjects of international significance. These articles generally are studies of results of specific disease-control methods or of the geographic distribution of diseases or reports of specific subjects which are made by expert consultants on behalf of WHO. Such reports are designed to determine the present state of knowledge and to provide a current synthesis of such knowledge. Also included in the *Bulletin* are laboratory studies on subjects within the organization's scope of interests, such as environmental sanitation, brucellosis, and trachoma, which enable laboratory workers

to adopt uniform methods and achieve comparable results.

WHO has established panels of experts in 36 separate specialties in the health fields:

- Addiction producing drugs
- Antibiotics
- Biological standardization
- Brucellosis
- Cancer
- Cholera
- Chronic degenerative diseases
- Dental health
- Environmental sanitation
- Health education of the public
- Health laboratory methods
- Health statistics
- Insecticides
- International pharmacopoeia and pharmaceutical preparations
- International quarantine
- Leprosy
- Malaria
- Maternal and child health
- Mental health
- Nursing
- Nutrition
- Occupational health
- Organization of medical care
- Parasitic diseases
- Plague
- Professional and technical education of medical and auxiliary personnel
- Public-health administration
- Rabies
- Radiation
- Rehabilitation
- Trachoma
- Tuberculosis
- Venereal infections and treponematoses
- Virus diseases
- Yellow fever
- Zoonoses

From these groups, expert committees are drawn to study and report on specific problems. These experts are internationally well-known in their own special fields, and their findings represent a consensus of the latest and most reliable opinion available on the respective subjects. The reports of these committees comprise the Technical Report Series. More than 140 Technical Reports have been published, covering a wide range of topics—School Health Services, Biologic Standardization, Nutrition, Accidents in Childhood, Chemotherapy and Chemoprophylaxis in Tuberculosis Control, Juvenile Epilepsy, and Insecticides.

WHO publishes a series of monographs which are comprehensive, technical works dealing with specific health problems. Examples of subjects in the 35 monographs which have been published are: The Rural Hospital, The Psychiatric Aspects of Juvenile Delinquents, Milk Pasteurization, The African Mind in Health and Disease, Advances in the Control of Zoonoses, Poliomyelitis, Influenza, and Experiment in Dental Care.



Fig. 1. Status of a WHO antimalaria campaign as of December 31, 1956

The *Chronicle*, published monthly in English, Spanish, and French editions, contains information on WHO and its principal activities as well as summary reports of meetings of its expert committees and other advisory groups.

The *WHO Epidemiological and Vital Statistics Report*, published monthly in English and French, contains vital statistics on births and deaths, incidence of notifiable disease, and other epidemiologic and demographic information.

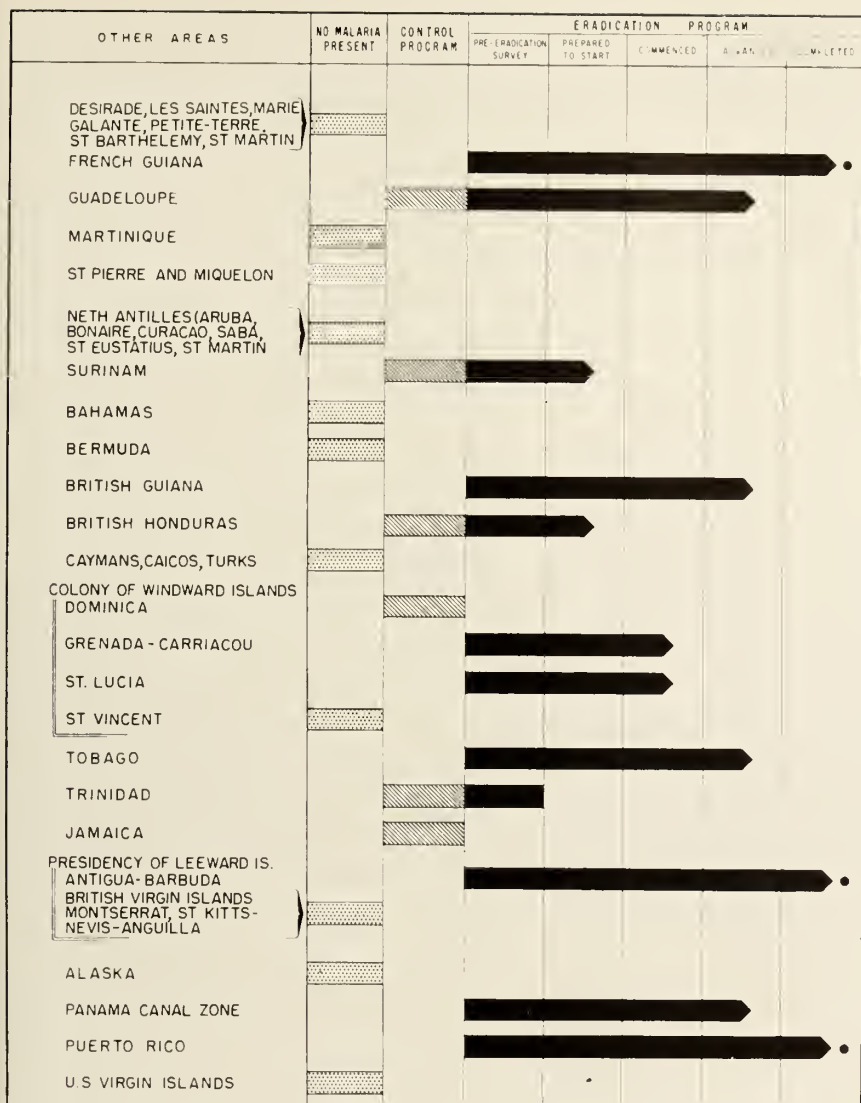
The *International Digest of Health Legislation*, published monthly in separate editions in English and French, is the only periodical devoted to health legislation of international significance. It summarizes in each issue the recent legislation of significance in a particular field, such as nursing, communicable diseases in schools, mental health, and tuberculosis.

TECHNICAL ASSISTANCE TO GOVERNMENTS

The primary objective of WHO in rendering technical assistance to governments is to help them build strong and effective indigenous health services. During the year 1958, it is providing assistance to more than 112 countries and territories.

In accordance with priorities agreed upon by the first World Health Assembly in 1948, WHO has concentrated its greatest efforts on the control of communicable diseases and on problems of wide social significance, such as maternal and child health, nutrition, and environmental sanitation.

Malaria, tuberculosis, and the treponematoses have been the objects of WHO's most concentrated and most successful attacks. Ten years ago, it was estimated that 300,000,000 persons



contracted malaria each year. According to the latest available estimates, 200,000,000 persons were afflicted by malaria in 1957.

Experience gained from control programs by 1955 and the increasing evidence of mosquito resistance to insecticides inspired WHO to urge countries to think in terms of *eradication* of malaria rather than *control*. Today, eradication is practically achieved in 9 countries or territories and far advanced in 7 others. Eradication programs are presently being carried out in 44 countries and are about to get under way in 16 others. The status of malaria eradication in the Americas at the end of 1956 is indicated in figure 1.

Approximately 5,000,000 people die of tuberculosis each year, and millions more suffer its

weakening effects. The international attack on tuberculosis by WHO and the United Nations Children's Fund (UNICEF) has included mass BCG vaccine campaigns and programs aimed at improved sanitation and nutrition. By the end of 1957, 200,000,000 persons had been tested and 80,000,000 had been vaccinated. WHO is now beginning to provide assistance in establishing pilot projects on the use of the new anti-tubercular drugs in the domiciliary treatment of the disease.

WHO-assisted programs have shown remarkable results in campaigns against the treponematoses, the most dramatic of which are perhaps the yaws eradication campaigns.

In 1950, it was found that a single injection of penicillin could cure a high percentage of

cases of this disfiguring, disabling disease in as little as ten days. So far, 55,000,000 persons have been examined and 16,000,000 successfully treated in yaws eradication campaigns with the assistance of WHO.

Education and training. WHO recognized at the start that health problems throughout the world could be solved only if there were trained personnel available for the tasks involved. By the end of 1956, the organization had awarded a total of 6,174 fellowships to recipients from 150 countries and territories in an attempt to meet this need. Of this number, 65 per cent went to physicians, 12 per cent to nurses, and 6 per cent to sanitarians. The remaining 17 per cent went to statisticians, health educators, physical therapists, pharmacists, and veterinarians.

WHO assists local teaching institutions by providing international instructors in many disciplines in the health fields. These instructors, in addition to their direct academic duties, help acquire and organize teaching materials and train local personnel to carry on the work.

Another service provided by WHO is the compilation of essential information on medical education. The data which have been published in the *World Directory of Medical Schools* include a narrative description of medical education in the country followed by a list of the institutions with the dates they were founded, the

number of students at the time the information was solicited, the number of students admitted and graduated yearly, and the number of teachers. A similar directory of dental schools throughout the world is being compiled and will be published shortly.

Medical education was given additional support in 1952 when WHO and the World Medical Association, which has official relationship with WHO as an international nongovernmental organization, jointly sponsored the First World Conference on Medical Education. The second of these will be held in Chicago in 1959.

SUMMARY

WHO's ten-year record is proof of what can be done to relieve suffering and improve living conditions through cooperative effort which successfully surmounts geographic, cultural, and political barriers. WHO can be justifiably proud of its record on the occasion of its tenth anniversary, not only because of its measurable accomplishments and contributions but also because through its efforts people of the world have become aware of their health problems and have learned of measures which can be taken to solve them. The world is small. What happens in Geneva affects every doctor in Minnesota and gives him better tools with which to work and a better world in which to live.

THE FOLLOWING is a recent statement by President Eisenhower in which he wholeheartedly endorses the work of the World Health Organization.

"The people of the United States are proud to share in the work of the World Health Organization and the related Food and Agriculture Organization. These broad and constructive programs give promise of raising the social and economic conditions of all peoples, a necessary prerequisite to the prosperity and security of all nations."

International Cooperation in Public Health

Prior to the Establishment of the World Health Organization

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INTERNATIONAL COOPERATION does not flourish in wartime except between allies, and, during World War II, the flow of work of the principal international health agencies was reduced to a mere trickle. These prewar precursor agencies of WHO were the Pan American Sanitary Bureau, Washington, D.C.; the International Public Health Office, Paris; the Health Organization of the League of Nations; and the Division of Industrial Hygiene of the International Labor Organization, Geneva, Switzerland.

Two new official international agencies were established during wartime — the United Nations Relief and Rehabilitation Administration and the Food and Agriculture Organization of the United Nations — each of them concerned with the prevention of disease and maintenance of health.

The International Public Health Office has now ceased to exist; its functions and assets have been taken over by WHO. The Health Organization of the League of Nations has passed into history, having pioneered, explored, and formulated international health programs which foreshadowed almost every aspect of WHO's present activities. This organization deserves the major credit for laying the foundations of FAO and WHO.

UNRRA has also gone, leaving behind a rich legacy of bold precedent on which new and richer international health, social, and economic programs might be based. The Pan American Sanitary Bureau, while maintaining its own identity, has become the regional bureau of WHO for the Americas and is now enjoying greatly

enlarged budgets and expanded programs. FAO, offspring of the League of Nations' campaign for better nutrition throughout the world, is one of the specialized agencies of the United Nations. It is located in Rome, long the seat of the International Institute of Agriculture.

All of these agencies were organized along similar lines, and, with the exception of FAO, all shared certain basic functions — to prevent the introduction of infectious diseases into the countries concerned and their spread between these countries, to restrict quarantine measures to the minimum compatible with safety, to collect and distribute epidemiologic intelligence, to act as consulting agencies to national health administrations, to assist in raising the level of national public health services, and to promote liaison among them.

As to structure, all of these agencies were subject to the direction and control of their member states meeting periodically in assembly or conference. A smaller board, council, or governing body, which acted as an executive committee and met at more frequent intervals, prepared the work for the conference or assembly and acted for the assembly in the intervals between assembly sessions. Most important for the evolution of international cooperation was the creation of the secretariat, or civil service, composed of men and women with professional training and dedicated to the ideals of "one world." It was the League of Nations which raised the value of the secretariat to its highest level as an instrument for organizing and strengthening the ties which bind the nations together in peaceful pursuits.

When, in 1939, for the second time, the lights began to go out all over Europe, farsighted friends of international cooperation demanded that something be done to save the technical work of the League and International Labor Organization, which continued to perform outstanding work but were now threatened with extinction. The problem was to conserve the

FRANK G. BOUDREAU, *president of the Milbank Memorial Fund, New York City, was the 1957 recipient of an Albert Lasker award of the American Public Health Association. He had been a member of the Health Section of the League of Nations and attended the first United Nations Conference on Relief and Rehabilitation as a member of the respective secretariats. In 1946, he was a United States delegate to the International Health Conference held in New York City.*

key personnel, which could only be done by sheltering them in a country outside of the zone of direct hostilities and providing them with the work needed to maintain their skills and morale. The International Labor Organization thereupon took refuge in Montreal, Canada, and part of the Financial and Economic Organization of the League accepted the hospitality of Princeton University.

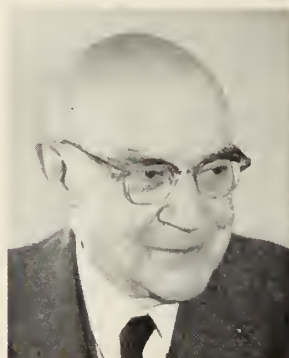
PREWAR INTERNATIONAL HEALTH AGENCIES

The earliest of these agencies was the *Pan American Sanitary Bureau*, established in 1902 by the first International Sanitary Conference of American States, not including Canada. The chief function of PASB was to prepare a sanitary code which would reflect progress in the knowledge of disease causation, such as Finlay's theory that yellow fever was mosquito borne. After many years of effort, the Sanitary Code was adopted by the Pan American Sanitary Conference in 1924 and ratified by all of the 21 republics.

The International Public Health Office (Office international d'hygiène publique) was established in 1909 with headquarters in Paris. Its principal functions were the preparation, enforcement, and periodic revision of the international sanitary conventions: the major legal instruments defining the measures of prevention to be applied to airplanes, ships, trains, passengers, and goods which crossed national frontiers, in relation to plague, cholera, smallpox, typhus fever, and yellow fever. The Office was supported by contributions from its members of approximately \$50,000 a year. Its work during the first and second world wars was seriously interrupted, and, in recent years, its functions and assets have been taken over by WHO.

Most important of official international health services before World War II was the Health Organization of the League of Nations, consisting of an Advisory Council; a Health Committee of a dozen members, some of them heads of leading health administrations, and others who were experts in their own right; and the Health Section of the Secretariat of the League, made up of some 15 medical officers. The mandate of the Health Organization consisted of a few words in the League's charter, calling upon member states to take action in matters of international concern for the prevention of disease.

The Health Organization possessed a number of unique advantages which permitted it to develop rapidly and to create useful precedents for the future. It was established at a time when Europe was faced with the threat of being overrun by massive epidemics of cholera, dysentery,



DR. BOUDREAU

and typhus fever from Eastern Europe and was saved by an Epidemic Commission which the League Council had set up on a temporary basis.

Previously, communication between national health services had always been by way of the foreign offices. It is not difficult to imagine to what extent the utility of such communications was lost by long delays. The very brevity of the Health Organization's mandate gave it freedom to pioneer and experiment, and it benefited greatly by being part of the most complete international organization that had yet existed. The Organization's activities in health were supplemented by other League bodies concerned with social affairs, finance, economics, transportation, communications, and the health and welfare of labor. Possibly its greatest advantage was that the Organization, like the League itself in the aftermath of the most destructive war in history, appealed to the generous instincts and aspirations of mankind and was confronted by tasks which its member states could solve only by unprecedented cooperation.

As a result of these and other advantages, the Health Organization took precedent-making steps in the following fields:

1. The establishment of a world-wide system of epidemiologic intelligence which, for the first time in history, worked rapidly and accurately enough to be of real service in the prevention of disease.

Notifications of the existence of epidemic disease came in by telegraph and radio; they were broadcast in code and in clear by a number of radio stations so that news of infected ports and territories could travel from country to country and from port to port even more rapidly than the spread of disease.

2. The founding of a technical assistance program to underdeveloped countries which, to-

gether with other sections and organizations of the League, helped governments in the prevention of epidemics; resettlement of refugees; provision of housing, seeds, agricultural implements, clothing, food, and medical supplies; construction of roads and railways; and, ultimately, the establishment of medical schools, research centers, and schools of public health.

The League's efforts in technical assistance began in such countries as Bulgaria, China, and Greece and extended from assistance in stamping out disease to systems which included all of the measures mentioned above as well as port quarantine, hospital administration, and flood control.

At one time there were some two score League experts in China, including nationals from many countries loaned to the League for service in China and reporting to a National Economic Council set up by the government of China for collaboration with the League in its own national reconstruction. At the moment when this technical assistance was at its height, the Sino-Japanese War began with the Manchurian Incident and was followed by the outbreak of World War II, which brought the peaceful reconstruction to a halt.

3. Initiation of work in a series of health fields, such as international standardization of biologicals, organization of international courses in public health and malariology, awarding of fellowships to train personnel for national health services, organization of collective study tours, preparation and conduct of international conferences on rural hygiene, and the like.

4. The establishment of the first regional health bureau, which became the League's Eastern Bureau of Epidemiologic Intelligence at Singapore.

INTERNATIONAL LABOR ORGANIZATION

Although not primarily a health agency, the International Labor Organization had as its objective the health and welfare of labor. Its chief characteristic was the representation of government, labor, and management in national delegations to the International Labor Conference and in the composition of its governing body. Vigorous and courageous leadership enabled the ILO to grow rapidly in size and prestige; its secretariat was second only to that of the League in numbers and was known for its professional competence. The ILO performed its work by means of declarations, recommendations, and draft conventions. Its preliminary studies and investigations were frequently of outstanding merit. Members of the organization were bound

to submit its draft conventions to their parliamentary bodies for ratification. At present, as in prewar days, ratification is a slow procedure unless governments are spurred to action by emergency situations.

After the United Nations was established, the International Labor Organization became one of its important specialized agencies, and, after war ended, it was able to return to its own buildings on the shores of Lake Geneva. It is interesting to remember that the United States became a member of the ILO during the Roosevelt administration, when Frances Perkins was Secretary of Labor, before the U.N. was established. The health of labor had always been an important concern of the ILO, and this concern was emphasized by the setting up of a Division of Industrial Hygiene in 1926.

INTERNATIONAL AGENCIES CONCERNED WITH HEALTH ESTABLISHED DURING THE WAR

All that had been done in international health cooperation before World War II was overshadowed when the *Relief and Rehabilitation Administration* was set up by the U.N. to restore and rehabilitate nations which had suffered occupation or devastation.

UNRRA's Health Division was established in December 1943. Together with the Division of Medical and Sanitation Supplies it constituted the largest international health service in history. Approximately \$170,000,000 were expended by these divisions during the three years of their operation. This is in contrast with the sum of less than \$500,000 expended by the Health Organization of the League of Nations in its best financial year. The largest proportion of UNRRA's expenditures for health purposes went for medical and sanitation supplies, but about \$22,000,000 were spent for health activities roughly comparable to those of a pre-war international health organization.¹ Sawyer² presented an excellent account of UNRRA's health work in the *American Journal of Public Health*.

UNRRA, being a temporary agency, turned over to the Interim Commission of WHO the sum of \$1,500,000 to enable the Commission to complete some of its projects, including fellowships, work in tuberculosis and malaria, and missions of experts to countries with special needs. The broad scope of UNRRA's work and the precedents it created by its imaginative approach to world health problems enabled WHO to begin its work on a higher level than had ever been possible before in history.

The establishment of the *Food and Agriculture Organization* of the U.N. came as the direct

result of international conferences held in Hot Springs, Virginia, in 1943 and in Quebec in 1945. Less directly, the origin of FAO goes back to the middle 1930's when the Health Organization of the League, which had long been concerned with human nutrition, was joined by other League sections and organs, including the ILO, in a campaign to combat the world-wide economic depression and the human misery and privation which it was causing in so many countries. Lord Bruce of Melbourn, a member of the League's Council, proposed the "marriage of health and agriculture" to emphasize the need for greater production and better distribution of food to restore and maintain human health which, in many parts of the world, was threatened by undernutrition and malnutrition while surplus food products were piling up.

Member states of the League joined in this campaign with enthusiasm. Surveys of nutritional status were undertaken in many countries, and the public began to see the folly of destroying food surpluses while the unemployed could not obtain the food they needed for health.

When war broke out, an informal group in Washington, D.C., which had been associated with the League's nutrition campaign, decided to keep the movement alive. The late F. L. McDougall, economic adviser to Lord Bruce, was invited to join the group, and he interpreted their ideas in a brief memorandum which induced President Roosevelt to issue the call for the first general conference of the United Nations in wartime held at Hot Springs in 1943. That conference created an Interim Commission to prepare for the establishment of FAO in 1945 with Lord Boyd-Orr of Brechin as its first Director-General. First located in Washington, D.C., it has moved its headquarters to Rome, long the site of the International Institute of Agriculture, which it has absorbed.

Thanks to the initial impulse given to the movement by Lord Bruce, Frank McDougall, Lord Boyd-Orr, and the Health Organization of the League, the emphasis in FAO's program is on food for health; its surveys of food consumption have developed in accuracy and world cov-

erage. Its activities in the field of health through better nutrition entitle it to a place among the agencies concerned with world health both before and after the establishment of WHO.

SUMMARY

While modern war does not provide favorable conditions for cooperation among the nations on a world scale, the struggle to survive in World War II forced the United Nations to resort to unprecedented forms of collaboration, disregarding in the process certain ancient national rights and privileges which had long hampered the growth of international agencies. Some of these forms of collaboration did not survive the war. However, statesmen who looked to the future realized that when hostilities ceased, existing international problems would not only persist but would probably become more acute because of rapid advances in science and technology. Their views were reflected in the establishment of the specialized international agencies already mentioned as well as UNICEF, UNESCO, the International Bank, the Monetary Fund, the Economic and Social Commission, the central organization of the United Nations itself, and all of the international machinery now existing or in preparation. For the war had shown that such instruments must not only be able to arrest the outbreak of hostilities but must also be capable of organizing and strengthening the ties which bind the nations together in peaceful pursuits. The exploration, pioneering, and experimentation carried on during the first half of this century by international health agencies, profiting by the unprecedented advances in preventive medicine and public health in the last twenty-five years, have blossomed into a more complete international system for assisting governments to prevent disease and to maintain health than even the most optimistic might have imagined possible in prewar days. Health has led the way in teaching the lesson that, in the long run, the approach to the prevention of war must be positive rather than negative, for lasting peace may be achieved only by building it into the hearts and minds of men.

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Professional Education in WHO Programs

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LOOKING at the work of WHO in different countries and regions of the world, one can easily observe that a considerable part of an organization's activities are essentially educational. Every year about 1,000 fellowships and travel grants are awarded for studies abroad, and their total number from the beginning of WHO work has reached the 8,000 mark. Teaching staffs, assigned by WHO on each country's request, work in schools of medicine, public health, or nursing in over 20 countries; in several others, they co-operate in the training of auxiliary and ancillary health workers. A number of courses and seminars are assisted by WHO workers every year in individual countries or organized as international training projects. For instance, in only one region of Southeast Asia in 1956, over 3,700 nurses, midwives, and auxiliaries attended courses assisted by WHO personnel.

In Europe, where the individual countries request less direct assistance, preferring WHO to facilitate the intercountry cooperation, two-thirds of the WHO activities can be classified as educational. They consist of international courses, seminars, educational conferences, exchange of teaching personnel, and fellowships.

Besides such purely educational projects, many other activities in all regions contain substantial educational elements. Demonstration teams in child health, tuberculosis, venereal diseases, malaria, yaws, and so on have as one of their principal objectives the training of their local counterparts and as many local personnel as necessary to continue successfully the work after the international personnel have been withdrawn.

EDUCATIONAL OPPORTUNITIES

The imagination of many peoples and governments was captured after World War II by the

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progress in medicine and the health sciences and by the potentialities of international co-operation. These great expectations gave rise to ambitious health programs in many areas which seemed to forecast concentrated, vigorous, and successful attacks on ill-health throughout the world. However, it soon became evident that there were many obstacles along the way. Two of the most important ones required long and patient educational action. One was the insufficient flow of medical and public health knowledge between the countries and between the linguistic and cultural groups of countries; the other was the shortage of adequate professional personnel for medical and health work in many countries. To overcome these two obstacles, or at least to reduce their importance, has become the goal of the WHO educational program.

Experience with international work has shown that lasting results in any branch of public health can be achieved only if the program is based on adequately trained and properly oriented local personnel. The seriousness and size of the problem are evident from such figures as a ratio of 1 doctor to 60,000 persons in some countries in Asia and Africa. Larger, but still very low, ratios are found in many other countries. Similar shortages of trained nurses prevail in most countries, and the shortage of sanitation personnel is perhaps even more acute.

There are countries with no facilities for training any of these professional groups, and, in some of them, there was not a single local person qualified in any of these professions. Many more countries lack facilities for specialized training in some essential branches of public health, medicine, or nursing. In view of this situation, WHO decided to assist the countries in the establishment and development of their training institutions—advice is given on request on the organization of schools, curriculum, and teaching methods; visiting teaching staffs are sent with the main objectives of preparing local teachers and establishing the teaching program; and fellowships for study abroad for local prospective teachers are offered. A few examples may show some of the various situations WHO meets in different countries:

• In Ethiopia where there is no medical school and almost all doctors in the country are foreigners, a school was organized for health assistants who could assume some elementary duties in the rural areas. A few qualified young students were sent on fellowships abroad to medical schools with the view of forming on their return a nucleus of the Ethiopian medical profession. The establishment of the school for health assistants in Ethiopia is interesting because it is a joint project in which WHO cooperates with the International Cooperation Administration of the United States government with the active participation of Ethiopian authorities. Similar schools were assisted in Burma, Nepal, and Libya.

• In the countries of Eastern Mediterranean, a great need was felt for an institution in which senior nursing administrators and nursing educators could be trained. WHO assisted the government of Egypt and the University of Alexandria in the establishment of the Regional College of Nursing. Other countries of the region also cooperate in this venture. Many other schools of nursing are assisted by WHO in several countries on different levels of training—basic, postbasic, and auxiliary.

• The University of Costa Rica wished to explore the possibility of establishing a medical school and asked for WHO cooperation in the form of consultation. Now the school has already started to work through the national effort.

• Scandinavian countries, in spite of their high standards of public health and of medical education, wished to raise still higher the specialized training of their health officers but felt that the teaching resources and the population of any one of these countries were not quite adequate for the purpose they envisaged. WHO assisted in working out a program for all Scandinavian training courses in public health and strengthened the teaching by bringing professors from other areas. This program may gradually develop into a Scandinavian School of Public Health, into which the combined resources of the participating countries can be pooled.

A great degree of flexibility has to be applied in the educational program because the requirements and conditions of the various countries differ considerably. WHO cannot limit its assistance to a few types of programs and exclude others equally needed. It has to find most suitable ways to meet the different needs of the country as closely as possible. There was hardly a profession in the health field for which WHO had not made some arrangements for training personnel, including senior public health offi-



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cials; teaching staffs of professional schools on postgraduate, undergraduate, and auxiliary levels; medical and health ancillary personnel; and, in some exceptional cases, even undergraduates.

The strengthening of national training resources is, wherever possible, based on the country's needs of health personnel and its training potentialities. Availability of foreign resources is also taken into account in this connection.

• Countries are encouraged and assisted in setting up national study groups and holding conferences on medical and related education; several such studies have already been made in Southeast Asia, Eastern Mediterranean, and some parts of Latin America. In this respect, WHO, having collected much information from all parts of the world can assist countries with all this information and impartial advice through its multinational staff and consultants.

These examples illustrate only some fragments of educational field work which gradually developed in all the six regions of the Organization. It is accompanied by activities at the Geneva headquarters which assist the regions in the planning and development of their programs. Here also the trends in professional education are studied; ideas and methods potentially suitable for international work are explored; information from countries is assembled, analyzed, and put at the disposal of others; and organization-wide programs are planned and coordinated. Liaison and cooperation are maintained with other agencies and institutions interested in education, such as UNESCO, World Universities Association, and International Bureau of Education, and in professional training, such as World Medical Association, International Council of Nurses, The Rockefeller Foundation, Kellogg Foundation, bilateral government agencies, and many nongovernmental bodies. Some 50 in-

ternational scientific associations in all branches of medicine joined the Council for International Organizations of Medical Sciences, sponsored jointly by UNESCO and WHO, in order to coordinate some activities in the exchange of scientific information.

PROGRAM DEVELOPMENT

The educational program of WHO was and is influenced in its substance and methods by a number of circumstances:

1. The experiences of other agencies, such as the former health section of The League of Nations, the international programs of the Rockefeller Foundation, the Pan American Sanitary Bureau, and UNRRA.
2. Requests from the countries for advice and assistance in training.
3. Advice from outside consultants, advisory panels, and professional groups.
4. Results of WHO's own studies and observations.

Subjects of particular interest or of program importance are submitted to expert committees or study groups who advise the organization on its technical work. Among the educational subjects discussed in this way were (1) teaching of preventive and community aspects of medicine; (2) introduction of radiation medicine into medical curriculum; (3) training of foreign postgraduate students in public health schools abroad; (4) postbasic nursing education; (5) health education in medical, nursing, and related curricula; (6) training of sanitary engineers; and (7) training of auxiliary health workers.

A considerable amount of information is usually collected in connection with these and other educational meetings. Other information comes from consultants and visiting teaching staffs and from government and educational institutions. Professional WHO staffs also conduct studies in the various parts of the world. Part of this material is published from time to time; some is sent to governments on request, and some is used in current work or awaits later utilization.

Exchange of scientific information through carefully organized personal contacts aims at keeping the teachers and key public-health administrators abreast of the advancements in their fields in other countries. Among various methods applied, the visiting teams of medical scientists attracted particular interest. Composed of scientists recruited on a wide international basis, these temporary faculties worked on the average of about one month each in over 20 universities and arranged conferences on medical education in 6 countries. Traveling international seminars in public health were organized in 3 regions. The number of international seminars or study

groups in the various health subjects usually exceeds 10, and sometimes reaches 20 a year. Some of them refer to purely educational subjects—like a series of world-wide and regional discussions on the teaching of preventive medicine and another on the teaching of pediatrics—others provide for mutual education of the participants in selected medical or public health subjects.

Travel grants and fellowships for advanced studies give useful occasions for the exchange of information and knowledge between health workers. Hence, they are considered among the most important educational activities in WHO. Continuous effort is maintained to make this activity as effective as possible through proper selection and preparation of candidates and judicious placement in properly selected institutions. A recent evaluation study of WHO fellowships shows that the proportion of successful studies and subsequent successful work on return exceeds 90 per cent.

Much of WHO educational work, and particularly its fellowships, is based on the good will of the cooperating countries and the over 1,000 institutions which accept WHO fellows, very often without charge.

It is believed that the value of WHO educational programs consists not only in raising the level of professional competence of health workers throughout the world, but also in the advancement of international understanding and the increase of faith in friendly international co-operation for which education is perhaps one of the best and most durable bridges.

The future of WHO educational work depends on the means at its disposal—at present, some one and a half million dollars a year may be considered spent for educational programs—and the degree of cooperation it will enjoy from government institutions and peoples of the world.

The main objectives of WHO programs in professional education are:

1. To establish realistic national programs for training health personnel in all countries, based on their needs and conditions.
2. To assist in raising of professional educational standards in all countries by developing national and regional institutions to levels compatible with the tasks of health personnel.
3. To strengthen further the international co-operation so that the training and research resources available in different countries may be utilized most effectively in the interest of health of all countries.
4. To search for still better forms of international educational work.

Environmental Sanitation in a Global Setting

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THE EXPERT COMMITTEE on Environmental Sanitation of the World Health Organization has defined environmental sanitation as, "The control of all those factors in man's environment which exercise or may exercise a deleterious effect on his physical, mental and social well being."

In one form or another, most of the problems of control of the environment are still with us in some parts of the world. They are as old as that of providing a water supply for a small village, as new as the disposal of atomic wastes, as rural as the disposal of excreta from isolated dwellings, and as urban as the problem of atmospheric pollution and the disposal of wastes from factories.

Even during the period it was operating under an interim commission, WHO recognized the importance of environmental sanitation. As a matter of fact, the interim commission listed environmental sanitation as one of the "big six" problems of world health along with malaria, tuberculosis, venereal disease, nutrition, and maternal and child health. In February 1950, a permanent Section on Environmental Sanitation was set up within the Secretariat of WHO. This Section obtained Division status on January 1, 1952.

WHO quite early recognized that environmental sanitation is one of the components of a balanced public health program and that work in environmental sanitation is essential even in campaigns against a number of specific diseases. For example, the control and eradication of such diseases as malaria, yellow fever, and bilharziasis hinge upon control of environmental factors. Tuberculosis control also has an environmental phase. Certainly, adequate and safe water supplies have been demonstrated to have profound effects on the death rates of infants and young children. With this in mind, the Fourth World

Health Assembly in 1951 passed the following resolution:

The Fourth World Health Assembly, recognizing the supreme importance of providing, as an essential part of the public health programme, for the improvement of environmental hygiene and sanitation, including the development on sound lines of urban and rural planning and of housing schemes,

1. *Recommends* to all Member States that appropriate provision should be made to train, and to employ in their health administrations, adequate numbers of public-health engineers, town-planners, architects and other allied personnel;

2. *Requests* the Executive Board and the Director-General to give to Member States all possible help in creating the necessary training facilities.

In keeping with this as well as other resolutions of the World Health Assembly and directives of the executive board, the program of environmental sanitation is a broad one. It is carried on by both the central and regional offices of WHO and includes the following:

1. The stimulation and promotion of sanitation activities in individual countries with particular attention being given to building of an administrative organization, training of sanitation personnel, and dissemination of information. Typical activities are provision of short- and long-time consultants to governments at their request; conduct of country demonstration and teaching projects; and provision of technical consultants on such subjects as insect control studies, water treatment, sewerage design, industrial waste disposal, and water pollution control.

2. Leadership, consultation, and coordination in such fields as vector control; research on insects' resistance to insecticides; and promulgation of standards of water quality, food sanitation, atmospheric pollution, and radiologic health protection.

3. Cooperation and liaison with the UN and its specialized agencies as well as nongovernmental organization in environmental sanitation fields.

In carrying on its program of environmental sanitation, WHO from time to time calls on its

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MAGNITUDE OF THE TASK OF PROVIDING
A SAFE ENVIRONMENT

Provision and maintenance of a reasonably satisfactory environment for the people of the world is indeed a huge task. It is still unfortunately true that perhaps three-fourths of the world's population use water supplies that are unsafe and insufficient in quantity, dispose of excreta and wastes dangerously, consume milk and food which are subject to contamination, and live in inadequate housing and are plagued by diseases carried by insects and rodents.

In seeking solutions to the environmental sanitation problems of the world, WHO has encountered many difficulties. In many cases, failure to find a solution does not lie in the lack of fundamental knowledge but rather in the absence of methods applicable to a given situation. Almost invariably, it is impossible to superimpose the methods and technics of one culture on another different culture. Methods which can be utilized in the Western World may be totally unsatisfactory in the Orient because of differences in culture, technical development, and economic resources. The permanent solutions of the sanitation needs in any country are those that utilize to the maximum extent local materials and local labor and which do not deviate too widely from the established cultural pattern of that country.

An example is the problem of water supplies which presents, indeed, a paradoxical situation. There are undoubtedly a number of engineers in the world who are capable of providing a solution to the water-supply problem of any large city of 100,000 or more population. However, a standard method of providing a safe water supply for a village of 100 people in Africa or Asia is not available. It is not that the methods used in the Western World would not be satisfactory from a sanitary standpoint, it is that such methods in most cases would not be economically feasible. It is doubtful, for instance, that it will ever be possible to import enough hand pumps and well casings to provide the types of small wells used in the United States for all the villages of Africa. Local material and labor must be used, and the best method of using this material requires a high degree of technical training and imagination. Perhaps, in such communities, in countries which have no resources in ferrous metals, the solution will be found in the use of nonferrous products, such as vitrified clay, cement, and asbestos.



MR. BOSCH

THE PROBLEM OF COST

Cost is another problem which is always present in connection with environmental sanitation problems on a global basis. Environmental sanitation measures are cheap when they are measured in terms of per capita cost but, because of huge numbers of people involved, are expensive in terms of total cost. A safe water supply will eradicate endemic cholera at a low per capita cost if measured over the entire life of the water supply; nevertheless, it must be admitted that the first cost of such a water supply is high.

Often forgotten is the fact that only a small part of the cost of the water system should be charged to disease prevention; the larger part of the cost might well be charged to improvement of the standard of living. In this regard, environmental control differs from control of specific diseases by the administration of therapeutic substances. The cost of a smallpox vaccination campaign can be charged only to disease prevention. The use of a vaccine or an antibiotic for the control of a specific disease has no accompanying side effect of raising the standard of living, and, for that reason, direct cost comparison with environmental control methods are not valid.

WHO is giving ever increasing thought to the problems of financing of sanitation works. It is imperative that these financing problems be solved. Here, the sanitary scientist must join with the economist and political scientist in seeking a workable solution.

TRAINING OF SANITATION PERSONNEL

The greatest of all problems in the field of environmental sanitation is providing every country with a hard core of nationals of that country who are competent in the public health aspects of sanitary engineering. In this connection, the

Expert Committee on Environmental Sanitation of WHO at its second session stated:

The assumption, perhaps too widely made, that underdeveloped regions are not prepared for the services of the best-trained specialists in environmental sanitation can readily be contested. Countries of minimum resources are most in need of the highest expert service available, both for diagnosis of need and for planning of solutions. The relegation of these functions to less-adequately prepared persons results from a great misunderstanding of the complexity of the problems in environmental sanitation encountered in areas of low economic level. These problems require for their solution the impact of high intelligence, training, and experience, even when the number of persons possessing such qualifications is necessarily a minimum. It is unsound practice literally to send a boy to do a man's job.

Unfortunately, the need for trained sanitation personnel, such as sanitary engineers, is the greatest in the areas which have the fewest resources for training. The solution for this has been to bring in international personnel with the idea that they will work in the country until sufficient national talent can be developed. A moment's reflection will indicate that this is at best a stop-gap procedure. Ordinarily, international personnel do not stay long enough to become thoroughly acquainted with the language, the problems, and the culture of the country in which they are working. These personnel undoubtedly have a stimulating effect, but it is almost axiomatic that the best solution to sanitation problems in any country will be developed only when technically trained nationals of that country are available and willing to work on these problems. Obviously, sanitary engineers, just as members of other professions, are not trained totally in a matter of a year or two. The sanitary engineer must have basic training in engineering before he can be trained into the specialization of sanitary engineering just as an epidemiologist must be first trained as a physician. Sending the very young man out of his country for basic training has obvious disadvantages, among which is the problem of picking a lad of 17 or 18 years of age with some assurance that he will be able to complete a five- or six-year training program. Even more difficult to predict is his willingness to return to work in his native country after he has finished his training. Therefore, WHO as well as some of the bilateral health organizations are giving primary attention to developing national and regional training centers. Here, the training is in institu-

tions operating under the specific economic, cultural, and social conditions in which the trainee will be working.

This is not to detract from the value of sending well-selected individuals to foreign countries for training. However, these individuals should have received their first training in their own country or, at least, in their own geographical region. They should be persons who give promise of being able to exercise leadership roles either in the health organization of their country or in teaching institutes. Also, there is no implication intended that establishing national training centers would eliminate the use of international personnel. Such personnel could be very well used as consultants and teachers. From the standpoint of promotion of international understanding, the benefits of providing foreign training for selected individuals and the use of international consultants and teachers are very obvious.

ACCOMPLISHMENTS AND A LOOK AT THE FUTURE

Although a recitation of WHO's specific accomplishments in the field of sanitation will not be included here, it should be noted that they have been many and satisfying. WHO has assisted more than 30 governments in the establishment of environmental sanitation programs. At the present time, there are more than 50 demonstration and training projects in operation. Ten universities have been assisted in providing sanitation training. There has been a gratifying coordination of efforts between WHO and other agencies, such as UNICEF, the Colombo Plan, and the health program of the International Cooperation Administration of the United States government. As would be expected, in the early days of their development, these organizations worked rather independently of each other. Today they recognize the need for close cooperation in carrying on sanitation activities on a global basis. Already preliminary plans have been made by some of these organizations to carry on a concerted water supply program after the current malaria eradication program has reached a successful conclusion. There is every reason to believe that world-wide environmental sanitation will continue to improve. This improvement not only will bring with it a reduction in communicable disease but also will result in a better social and economic environment.

The Role of Health Education in Raising Standards of World Health

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IN ITS appetite for discovery, for explanation, and for making things work better, the restless scientific tradition, like a rushing river, has flooded the mysterious world of our ancestors and spread a thin film of order over the primeval forces which determined human behavior. Like boatmen, scientists have paddled their little canoes into the creeks and rivers of the world. In the migration, many invisible islands have been passed by, but others have appeared which are too impenetrable for their fragile tools. Man is one of these neglected islands.

In the pursuit of health and the conquest of disease, important progress has been made through the application of chemical and physical knowledge in the control of some grosser quantitative aspects of morbidity. This has been accomplished through means largely outside the control of the individual. The future must concern itself with the qualitative aspects of health and the enjoyment of life. These can never be provided for people by experts. This is the situation that confronts us in comparing our present condition with the state of complete physical, mental, and social well-being proposed by the World Health Organization in its constitution.

Where health education aims to give us a new way of looking at this paradox is in its underlying purpose of releasing the immense human resources in individuals and communities at present enchained by ignorance, anxiety, and fecklessness. Health education, to be of any significance in the adult world, must bring independence by cultivating an ability to choose.

Looking at such contemporary health problems as neurosis and mental health; the care of children; accident prevention; nutrition; rehabili-

tation of the aged, sick, and handicapped; and environmental hygiene, it is indeed hard to see how they can be tackled at all without cooperation of a knowing, willing, and capable public.

At the root of all problems of education in any culture are the relationships between the people concerned. In fields such as health, tradition characterizes the patient as passive and dependent and the doctor as authoritative, omniscient, or even magical. Many every-day expressions reveal a mixture of fear or even dread of doctors, and the word, "patient," reveals an attitude on the part of the professionals which is significant. Economics and education are changing the doctor—or nurse—patient relationship in most parts of the world. That these changes should be well understood and promote an educational relationship is the only way of making a virtue of this necessity. Because doctors and nurses are likely to be the most numerous professional workers and those to whom the public naturally turns for the discussion of health matters, the doctor—or nurse—patient relationship is a first consideration for the future of health education. As Kark and Naish have shown, there is good evidence to indicate that when practitioners of medicine sincerely believe that their patients can help themselves, dramatic results can be achieved. Similarly, where medical officers behave as if public health is public and not the private concern of specialists in the health department, remarkable interest and activity can result. The main supports of dependency in the relationships of those concerned are to be found in the social differences between doctor and patient, together with the lack of fundamental health education in the public.

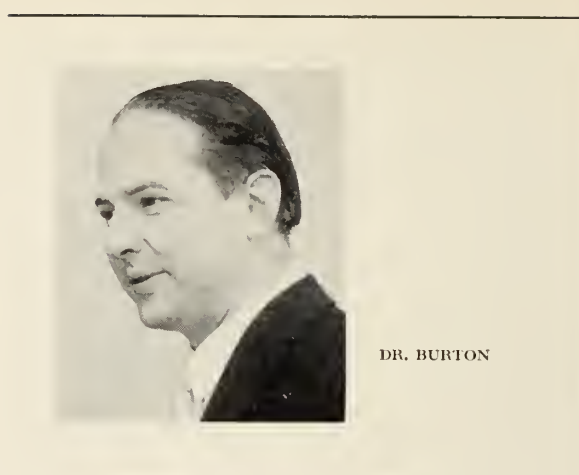
In this relationship, the medical profession is only dimly aware that it is the patient and his friends and relations who always make the first diagnosis or recognize that anything is amiss. As Koos has shown, it is they who decide whether they will consult a doctor or a quack, and finally it is they and a whole complex of social forces which determine whether they are willing

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or able to carry on the treatment. How well the patient makes these decisions determines the effectiveness of Health Services, and the ability to decide is determined by his educational state and his attitude to medicine generally. In the intimate clinical situation, only the doctor and nurse, trained and aware of this aspect of their work, are likely to be effective. Where institutions, such as hospitals or public health departments are concerned, a whole team of people is involved, and it is becoming increasingly evident that health workers specially trained in health education can play an essential role in raising the whole tenor of the relationship between medicine and the public. From this point of view, the future makes the dual demand for a medical and nursing profession trained in the attitudes and skills of health education and a public sufficiently educated to obtain the maximum benefit from the technical ability of the professional people. These developments put an increasing strain on the meager resources of this youthful profession.

Pari passu with its growing recognition, health education itself has been undergoing a philosophical revolution. The health propaganda of yesteryear is giving way to the health education of today. More and more is it recognized that information and exhortations are not enough. With totally inadequate financial resources for research and evaluation, health educators have been building up an eclectic discipline on the findings of psychology, sociology, pedagogy, anthropology, and a variety of other crafts and sciences. But the very powers which the introduction of these new sciences puts in their hands have dangers if the ethical position of the relationship with the public is unsound.

When professional people are convinced that some health measure is of benefit, the temptation is strong to use means for getting it done which may diminish the public's sense of responsibility and self-respect. The behavior sciences put powers into our hands which greatly augment the possibility of influencing people to pursue certain courses of action, and it is this which introduces the ethical problem. There are many ways in which authoritarianism can express itself otherwise than by crude dictation, and one of the dangers in the new techniques derived from psychology and anthropology is that the dictator of yesterday can too easily become the manipulator of tomorrow. The World Health Organization, the tenth anniversary of which we are celebrating this year, has given a remarkable example of how this difficult and vital ethical problem can be resolved. While firmly pursuing its



DR. BURTON

scientific policy, it has managed to avoid rigid patterns and any semblance of doing for its members what they should properly do for themselves. It has avoided both dictation and paternalism, while, at the same time, giving a definite lead. This has been achieved in the field of health education by the calling of expert committees and regional conferences. The first regional conference on Health Education held in London in 1953 demonstrated to what extent the new attitude was already accepted. The report of the first Expert Committee held in Paris in the same year was of particular interest in that its philosophy would clearly have been impossible ten years earlier. In addition to these specific meetings, health education has become an important element in the deliberations of many other WHO conferences and expert committees and has thus taken its necessary part in the practical deliberations of most aspects of health services. Having laid the foundations broadly and firmly in the areas of major interest to the future of world health, the Health Education section of WHO has in its most recent meetings turned its attention to the all important preparation of specialists and to the training of doctors, nurses, sanitarians, and others in health education.

If the flood of science is to be harnessed for the benefit of man, we must put at least as much energy and imagination into the human and biological sciences as we are so lavishly expending on the physical and chemical.

With trained health education workers of high integrity and a public capable of independent and voluntary effort, the appalling time lag between discovery and recognition will be shortened and those inner resources of individuals and groups which alone can enable them to manage their health affairs more wisely will be developed.

Nursing in World Health Programs

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THE WORLD HEALTH ORGANIZATION has given nurses, who constitute the largest group of health workers in most countries, great encouragement and support. In hospitals, public health departments, and industrial or school health services, there are few health programs which can be carried out effectively without the participation of competent nurses.

The number of qualified nurses in each country is usually influenced by (1) the status of women in the country and the attitude toward women who work outside of their homes, particularly if that work requires "the work with one's hands"; (2) the availability of general educational facilities to both sexes and to all children and youth regardless of their economic status; (3) the availability of professional schools of a high quality; and (4) the recognition of the fact that good schools of nursing attract good nursing students.

WHO was founded on the belief that "health was not merely the absence of disease or disability." Therefore, the practitioners in all fields of health service need a broad education which prepares them not only to give physical care to the sick, but also to prevent disease and disability, to promote both physical and mental health, and to rehabilitate those who have been sick and are disabled.

Nursing was recognized by WHO's first director general as an essential component of the health team, and, in 1949, a well-qualified British nurse, Miss Olive Baggally, was appointed nurse consultant at the WHO headquarters in Geneva. Her long experience as a chief nurse with UNRRA and as executive secretary of the Florence Nightingale International Foundation made her an excellent choice for this important post. Her responsibilities included developing nurse training programs in countries where none

existed and working toward the improvement of nursing education throughout the world.

Lyle Creelman of Canada, who served as Miss Baggally's associate, became the chief of the nursing service in 1954 upon her retirement. At the present time, an American, Elizabeth Hill, is Miss Creelman's associate in Geneva, and nursing consultants are included as regular members of the consultant staffs in each of the six regional offices of WHO.

From the very beginning, nurses have been members of WHO teams assigned to various countries to develop maternal and child health services, to help the national governments establish hospitals and health centers, and to organize field services aimed at the eradication of disease and the promotion of health. Of all the members of the health team, nurses have the closest and usually the most extensive contact with individual patients and their families. They are recognized as the ones who translate scientific information into simple language which the families can understand and will accept, because, although science has discovered new drugs and vaccines which will prevent or control smallpox, diphtheria, malaria, and other diseases, the value of these health practices requires the intelligent cooperation of individuals or families. In a democratic society, individuals have the right to accept or reject health procedures which are available to them. People tend to reject that which they do not understand. Nurses serve as the interpreters of new health practices and by precept and example secure the cooperation of the people.

It is recognized that good health services are dependent upon the availability of competent health practitioners. Therefore, the WHO nurses have emphasized the establishment of schools of nursing within member countries which will prepare nurses for positions of leadership in their own countries. Careful selection of good students from the national schools for additional study outside their own countries and assisting them financially through the WHO Fellowship program will also hasten the development of nursing leaders in each country. Some of the WHO nurse educators are assigned to organize

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new schools, and, in the beginning, the entire faculties may be WHO staff members. Their aims are to develop their national counterparts as rapidly as possible, turn over direct responsibility for the school to them when they have the essential qualifications, and then serve as supporters and consultants to the national nurses until they feel secure enough to take over. With this accomplished, the WHO educators will be withdrawn and may be reassigned to a new project in some other country.

The delegates who attended the World Health Assembly in 1954 recognized that nurses were essential members of the health team. They decided that they needed to know what the responsibilities of nurses were and what education nurses needed to carry them out. Therefore, the delegates voted to discuss the subject — Nurses: Their Education and Their Role in Health Programs — at their Assembly meeting in 1956.

Nursing and health education members of the WHO staff believed that the success of the proposed discussion would depend upon the extent to which nurses back home in the member countries discussed the subject prior to the scheduled Technical Discussions in May of 1956. The big question was, how could nurses throughout the world be reached and encouraged to discuss the subject widely and to formulate opinions and recommendations for the consideration of the delegates who were to attend the Ninth World Health Assembly.

This problem was solved by calling upon the two international nursing organizations which had been brought into official relationship with the WHO — the International Council of Nurses with headquarters in London and the International Committee of Catholic Nurses and Medical Social Workers with headquarters in Paris. Both organizations were delighted to be of service and agreed to urge their constituent national associations to sponsor the preliminary discussions within their countries. A simple discussion guide was prepared and furnished to both organizations for distribution to all of their national constituents. Nurses responded enthusiastically. While the guides were prepared primarily for nurses, in many countries the nurses invited members of the other health professions to participate in discussions. The discussion guide suggested that the nurses in each country summarize their opinions in answer to three questions:

1. What is your present role in the health programs of your country?

2. What role do you think you could or should play in your country?



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3. What changes in attitudes, educational facilities, and so forth will have to occur before you can play the role you envision satisfactorily?

Forty countries sent in comprehensive reports in answer to these questions. The background information prepared for the delegates was based on these replies, and copies of all reports were made available to the delegates for study during the meeting. The interest of the delegates in the 1956 Technical Discussions was greater than at any previous time. The 213 members of the delegations who voluntarily signed up to participate in the 9 group discussions appeared to enjoy the informality of group work and the opportunity to discuss the pros and cons of each statement made.

No effort will be made here to review the entire report. The complete report of the 1956 Technical Discussions was published in the July 1956 issue of the *Chronical of the World Health Organization*. A summary also appears in the October 1956 issue of the *American Journal of Nursing*. The consultant staff was amazed at the similarity of the conclusions reached by each group. Although a number of diverse viewpoints were expressed on such specific matters as whether nurses should administer intravenous injections upon a physician's order, there was general agreement with regard to five broad responsibilities which should be considered within the scope of the nurse in any country. These were:

1. Giving skilled nursing care to the sick and disabled in accordance with the physical, emotional, and spiritual needs of the patient, whether that care is given in hospitals, homes, schools, or industries.

2. Serving as a health teacher or counselor to

patients and families in their homes, hospitals or sanatoria, schools, or industries. Because of her extensive and intimate contact with patients and families, the nurse usually has the confidence of the family and is in a strategic position to put scientific information into simple language which they will understand, accept, and put into practice.

3. Making accurate observations of physical and emotional situations and conditions which have a significant bearing on the health problem and communicating those observations to other members of the health team or other agencies having responsibilities for that particular situation. Thus, the nurse is a very valuable liaison between the patient and the physician, research scientist, sanitarian, social worker, school teacher, or industrial foreman.

4. Selecting, training, and guiding auxiliary personnel who are required to fulfill the nursing service needs of the hospital or public health agency. This also involves an evaluation of the nursing needs of a particular patient and assigning personnel in accordance with the needs of that patient at a particular time.

5. Participating with other members of the team in analyzing the health needs, determining the services needed, and planning the construction of facilities and the equipment needed to carry out those services effectively.

When considering the education of nurses, a number of far-reaching conclusions were reached. It was decided that the attitude of the public toward the nursing profession must be improved since that more than any single factor influences the recruitment of competent students into the nursing profession. The delegates added that the public's attitude may be influenced most by physicians who must show their respect for and confidence in nurses. Several groups added that the number of qualified nursing school applicants increased as the educational program improved.

All groups agreed that the primary purpose of a school of nursing was to provide a sound education in nursing and not primarily to provide nursing service for a particular hospital even though clinical experience is an essential part of professional education. They advocated that, when possible, the school of nursing be administered as a separate entity under a university or other educational institution. They also agreed that the director of the school should be

a qualified nurse skilled in teaching and familiar with methods of educational administration.

In discussing the administration of nursing services and the most effective utilization of nursing personnel they said that, since in most countries nurses comprise the largest number of health personnel in either hospitals or health agencies, there should be a chief nurse at local, state, and national levels who is a member of the administrative health team. While a physician is usually the head of a multidisciplinary health team, the chief nurse should participate on that team in analyzing the health needs, planning how to meet those needs, and suggesting the personnel and facilities required to provide the services needed.

The delegates emphasized that there would be teams of various kinds and levels of nurses with a nurse for a leader. They suggested that the same principles of democratic team relationships pertain among the nurses and auxiliary workers included on the nursing team as had been advocated for the health team.

The importance of job analysis in nursing to be sure that each worker was utilizing her knowledge and skills effectively was advocated. They urged that nurses develop workers with less skill for those functions which do not require a nurse's education and training.

Shortage of personnel in remote or isolated areas was recognized as a serious administration problem. It was suggested that a system of rotation be worked out for personnel assigned to such areas, that comfortable living quarters be available, and that additional compensation be considered for hardship assignments.

Not all of these conclusions or recommendations can be fully carried out in most countries immediately. The delegates recognized that these were goals to be attained. However, progress is already evident in many countries. Several countries have had or are planning to have discussions on a national level similar to the one in Geneva. At the Quadrennial Congress of the International Council of Nurses last June, practically every paper given referred to some section of this report. Never before has nursing been discussed so thoroughly on an international level by a group of leading health administrators, physicians, and nurses. WHO has given the nurses of the world the encouragement and support which they have long needed and wanted.

Malaria Incidence in the World Today

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SIX YEARS AGO, after considerable study, I estimated that the number of malaria cases in the world totaled about 350 million annually, with 3.5 million deaths.¹ Two years ago, another careful look at the situation convinced me that a likely estimate for the year 1955 would be some 200 to 225 million cases throughout the world, with 2.0 to 2.5 million deaths.² Recently, I made a third canvass of available data, which is the basis of the following report.

Of course, it is realized that accurate vital statistics are rare, especially from underdeveloped countries. Malaria, in particular, is subject to much confusion. Sometimes, most fevers in an area are classified as malarial, and frequently many cases of malaria are not reported at all. But, due to the increased emphasis on malaria eradication during the past few years and with wider and more detailed surveys by better trained personnel, it is possible to present figures that probably are not misleading, although they certainly cannot be considered as more than estimates.

Using population data from the United Nations Demographic Yearbook of 1956 and malaria data from the World Health Organization (WHO), the International Cooperation Administration (ICA), and the United Nations International Children's Educational Fund (UNICEF), it seems likely that about 1.2 billion, or 44 per cent, of the world's total population of about 2.7 billion live in communities in which they are now or have recently been exposed to malaria infection. Of those living in endemic areas, it is estimated that some 800 million are receiving routine protection against malaria, which leaves some 400 million not under routine malaria control. Protection varies in quality in different areas from relatively ineffective distribution of quinine in a few places to highly satisfactory campaigns aimed at malaria eradication in many countries.

On the basis of data from WHO, it appears that by the end of 1957, country-wide malaria

eradication campaigns were in active operation in areas with a total exposed population of some 247 million. To recapitulate, the world malaria situation was probably something as follows at the end of 1957:

Estimated total world population	2,677 million	
Estimated total population exposed to malaria	1,200	"
Estimated total population under malaria eradication campaigns	247	"
Estimated total population under less effective routine control	553	"
Estimated total population without routine protection	400	"

How many cases of malaria occurred among the 400 million who were without routine protection no one, of course, knows. One might, however, assume the same 29 per cent incidence rate estimated by competent local observers to prevail in India in the early 1930's, when malaria control was minimal in a country of some 350 million living under all sorts of climatic conditions and degrees of malaria endemicity. If this rate is assumed, one might expect some 116 million cases of clinical malaria among the 400 million unprotected peoples in 1957. There must also have been a considerable incidence of the disease among the 553 million who were poorly protected. Perhaps one might conservatively assume a rate of 15 per cent. On the basis of these assumptions and estimates, there was a total of some 200 million cases of clinical malaria in 1957, with the usual death rate of about 1 per cent.

As mentioned above, some 247 million of the exposed population were under malaria eradication campaigns in 1957. It is worthy of note that during 1958, new malaria eradication campaigns are in operation to protect an additional 451 million.

Expressed in another way, of the world's total of 197 nations, territories, dependencies, or administered areas listed in the 1956 UN Demographic Yearbook, 63 are nonmalarious and 134 must be included in world-wide malaria eradication. Seventy now have such campaigns, so that 64 remain to be encouraged to make eradication plans.

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Certain aspects of the present situation should be mentioned. For example, very little information about malaria has come out of Communist China. Recently, Maegraith³ stated that the total population in danger of contracting malaria today is estimated to be "somewhere between 300 and 350 million." He comments that "in many areas antimalarial operations are already under way, the detailed national plan for control was finally settled only last year. The disease is to be controlled over the whole country. The ultimate aim is eradication, which is taken to mean what it says in some regions and, in others, a reduction of transmission by mosquito control and drug treatment to the point at which it becomes and remains insignificant. This is to be achieved by 1969." Maegraith adds, "The progress of the attack on malaria has so far been slow, largely because the essential basic biological data has taken so long to collect, but enough of this information is now available to allow the major attack on the disease to develop. It is being pushed forward with energy and devotion and should have every chance of success."

In the USSR over 4 million cases of malaria occurred annually for several years after World War II. However, according to reports from WHO, less than 10,000 cases a year are now occurring, and, on the basis of control measures now in force, no new infections are expected after 1960. Albania, Bulgaria, Hungary, Poland, Romania, and Yugoslavia have all attacked malaria vigorously with a view to eradicating the disease; all their exposed peoples are under good protection.

In Asia, it is notable that Thailand, with 12 million in endemic areas, now has in full swing an eradication campaign that covers the country. It has been so successful that in areas of some 4.3 million, active spraying has been discontinued and surveillance begun to find and to destroy the last foci of the disease. Another noteworthy point about Asia is that India, with some 360 million of its population living in endemic areas, has in 1958 begun a malaria eradication campaign after five years of excellent malaria control which considerably reduced the incidence of the disease. Taiwan and Ceylon are both progressing notably in their malaria eradication campaigns and expect complete success in the not too distant future.

In the Americas, the Pan American Sanitary Organization (PASO) is sparking and guiding a campaign that aims to eradicate malaria from North and South America and the West Indies in the foreseeable future. The objective has already almost been reached in a number of



DR. RUSSELL

countries. In the United States, provisional data⁴ indicate that in a population of some 170 million, the remarkably low number of 144 malaria cases was reported to our National Office of Vital Statistics in 1957. The Public Health Service has surveyed 40 of these cases, confirming 24, of which only 8 were found to represent infections contracted within our borders — four in California and 4 in Oklahoma.

The stages of progress of the countries now having malaria eradication campaigns follow:

I. *Preparatory phase* (14)

Egypt, Israel, Jordan, Southern Rhodesia, Swaziland, Union of South Africa, Zanzibar, India, Brunei, Indonesia, Laos, North Borneo, Sarawak, and South Vietnam.

II. *Early attack phase* (19)

Brazil, British Honduras, Costa Rica, Mexico, Panama, Dominican Republic, Guadeloupe, Haiti, Bolivia, Colombia, Paraguay, Peru, Madagascar, Iran, Iraq, Syria, Afghanistan, Burma, and Cambodia.

III. *Advanced attack phase* (27)

Canal Zone, El Salvador, Guatemala, Honduras, Nicaragua, Jamaica, Leeward Islands, Martinique, Trinidad and Tobago, Windward Islands, Argentina, British Guiana, Ecuador, French Guiana, Surinam, Venezuela, Albania, Bulgaria, Greece, Yugoslavia, USSR, Lebanon, Turkey, Ceylon, Philippines, Thailand, and Taiwan.

IV. *Consolidation phase* (8)

USA, Puerto Rico, France (Corsica), Italy, The Netherlands, Romania, Cyprus, and Gaza Strip.

V. *Maintenance phase* (2)

Chile and Germany.

In conclusion, it should be stressed that the great progress toward malaria eradication that has been made during the past ten years has been due in large measure to remarkable international cooperation between WHO, PASO, UNICEF, the United States Mutual Security agencies, and governments of the 70 countries that now have eradication campaigns.

WHO's effective leadership has stimulated nation-wide projects, demonstrated the feasibility

ity of residual spraying, provided fellowships and training courses, organized regional conferences, fostered inter-country and inter-regional unanimity, and financed basic research. PASO itself and as the regional office of WHO for the Americas has had a key role in the attack on malaria in the New World.

UNICEF has had a tremendous impact on malaria through its large appropriations which have totaled no less than 26.4 million dollars expended in some 56 countries from 1947 to 1957 under technical guidance of WHO. The 1958 malaria budget is approximately 8 million dollars. The gains of the past few years would have been impossible without this basic UNICEF financial and moral support.

The United States, through ICA and its predecessor agencies of the mutual security program, has also had a vital part in the global malaria eradication campaign. In addition to its relatively large share of the budgets of WHO, UNICEF, and PASO, the United States spent about 89 million dollars for malaria control and eradication from 1942 to 1957. The 1958 budget of ICA for malaria eradication is 23.3 million dollars.

Finally, it should be emphasized that approximately 60 per cent of the cost of malaria eradication campaigns is being borne by the countries concerned. Great credit should go to the political leaders of these countries for their support of malaria eradication.

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AS THE FIRST DECADE of the World Health Organization ends, it becomes obvious that international collaboration in health has justified itself and that its possibilities for the future are unlimited. Each year, the countries of the world are learning how to work together better for the common good. It has long been recognized that disease knows no boundary; nations are now beginning to realize that organization for health also has no boundary.

International Aspects of Occupational Health

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COOPERATION AMONG NATIONS in the control of communicable diseases is an obvious necessity which grows in importance with each new advance in methods of transportation. The elaborate systems which have been developed internationally to control the spread of living agents of disease are well known, and their effectiveness has been proved over and over again. When it comes to nonliving agents, such as chemicals and physical forces, the reasons for international cooperation are not so clear nor does the motivation for international action appear to be quite so strong. Contamination of the earth's atmosphere with radioactive materials is, perhaps, an exception.

When we move outside the realm of chemical and physical agents of disease into the larger spheres of occupational health, such as medical care for workers, workmen's compensation, sickness insurance, housing for workers, nutrition, vocational rehabilitation, and the like, the reasons for international efforts become quite nebulous. If, however, we accept an International Labor Organization declaration that "Poverty anywhere constitutes a danger to prosperity everywhere," the One World concept in occupational health takes on significant meaning, since good occupational health leads to good industrial production and this, in turn, to prosperity.

An important prerequisite to any international health activity is the existence of relevant health programs in a number of individual nations.

Interest in occupational health developed earliest in those countries in Western Europe which were the first to become industrialized, particularly, France, Germany, Great Britain, and Italy. A significant event with international implications was the publication in 1700 of the monumental work, *De Morbis Artificum Diatriba*, by Bernardino Ramazzini of Padua. The

translation of this book into English, French, and German during the early part of the eighteenth century showed that its value was recognized internationally, and it established a common international basis for an understanding of occupational diseases. This, of course, antedated the industrial revolution.

According to Teleky, the first attempts to secure international agreements on labor protection were made by a Frenchman named Blanqui in 1838. Similar efforts were made in 1840 by Villerme of France and Luc Le Grand of Switzerland. At a meeting in Geneva in 1866, the International Labor Association recommended the establishment of international codes for the protection of the health of workers. Several additional attempts along these lines were made during the latter years of the nineteenth century.

An International Congress for Labor Legislation was convened in Paris in 1900. An outgrowth of this meeting was the formation of the International Association for Labor Legislation, which had its first meeting in Basel in 1901. An International Labor Office was established in Basel in 1902, and this office began the publication of a bulletin dealing with labor legislation and safety regulations. The International Labor Office created a permanent Hygienic Council in 1908. These two organizations played an important part in securing the almost world-wide legislative controls which were imposed on the use of white phosphorus in the match industry, on the manufacture and use of white lead, and on the night work of women.

During World War I, all international groups suspended operations, but activity was resumed shortly after the cessation of hostilities. The present International Labor Organization (ILO) was created in 1919, under the terms of the Treaty of Versailles. The principles and procedures of this organization were stated in the treaty to be "well fitted to guide the policy of the League of Nations" in matters dealing with labor and industrial health. Although ILO received financial support from the League of Nations, it was not set up as a subdivision of the League. This meant that membership in the

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organization was not contingent upon membership in the League and that its decisions were not subject to the control of the Council of the League of Nations. This pattern made it possible for the United States to belong to ILO, even though this country never became a member of the League of Nations. ILO is the only intergovernmental body set up after World War I which has survived to the present time.

PRESENT ORGANIZATION AND ACTIVITIES OF ILO

This specialized agency of the UN differs from its sisters and brothers, WHO, FAO, UNESCO, and others, in that its policy-making body contains representatives not only of governments but of labor and employers as well. Each of its 77 member countries sends 2 representatives of government, 1 of labor and 1 of employers to the International Labor Conference. These representatives, in turn, elect 40 of their members in the same 2:1:1 ratio to the governing body which appoints the director general and is responsible for the work of the International Labor Office. The latter is, in reality, the secretariat of ILO, employing a large staff of experts to carry out the principal functions of research, education, and technical assistance in the broad field of occupational health. Long-term and short-term consultants are frequently engaged to assist in carrying out special projects in all parts of the world. An international expert advisory group known as the Correspondence Committee on Industrial Hygiene has been organized to help when needed. Regional offices, missions, or agents have been established in some 50 countries.

International agreements to restrict the use of white phosphorus, white lead, and night work for women were the first of more than 100 "conventions" to be adopted by the International Labor Conference of ILO. Nearly 90 of these are now in force, and they have received about 1,500 ratifications among the member nations. A ratifying nation agrees to be bound by the convention. Among the other conventions which have received wide ratification are those concerned with factory inspection, medical examination of young workers and seafarers, accident prevention, and anthrax.

Another important activity of ILO has been the development of what has become known as the International Labor Code. This code embraces the various conventions and a number of recommendations dealing with a wide range of subjects relating directly or indirectly to occupational health.



DR. GOLDWATER

Space does not permit a full account or even mention of all of the activities of ILO in its programs of education and technical assistance. Some of its publications are among the most valuable in the fields of industrial hygiene and industrial safety. ILO technical assistance has been invaluable, particularly to those nations which have recently begun to develop industries.

WORLD HEALTH ORGANIZATION

In many respects, the basic organization of WHO is similar to that of ILO. The policy-making body is the World Health Assembly from which an executive board of 18 members from 18 participating states is elected. The major functions are carried out by a secretariat with headquarters in Geneva and 6 regional offices. WHO began functioning on an interim basis in 1946, but its constitution was not formally ratified until 1948. Its membership now embraces about 90 nations. It is similar to most of the specialized agencies of the UN in that its policy-making body is made up entirely of representatives of governments. In this respect, it differs from ILO.

At the time of WHO's creation, an authoritative international body already existed (ILO) operating in the field of occupational health. For this reason, WHO did not immediately concern itself with this type of work, and it was not until 1950 that a section on Social and Occupational Health was established. It had been recognized that although ILO's concern was primarily with accidents and diseases of a strictly occupational origin while WHO's interest embraced a somewhat wider area of health, their activities would inevitably overlap somewhat. It was decided, therefore, to establish the closest possible coordination of the activities of the two

agencies in occupational health. This has been accomplished through a joint ILO-WHO Committee on Occupational Health, through close liaison between the staffs in Geneva, and through an agreement that experts who serve either ILO or WHO on special assignments are considered to be representatives of both. In actual practice, these arrangements have worked out very well. The committee, for example, has held three meetings, each of which has been highly productive.

In their dealings with member nations, it is quite natural that ILO should establish relationships with ministries of labor and WHO with ministries of health. At the national level, responsibility for occupational health may be vested in health ministries, labor ministries, or in both. The existence of occupational health programs in the two international bodies offers easy and familiar access to assistance regardless of the administrative pattern in any country.

Up to the present time, the occupational health work of WHO has been almost entirely in the fields of education and technical assistance. The educational work involves sending experts to various countries to give formal instruction or to train selected professional persons to handle jobs in occupational health. The writer has recently completed such a mission in Egypt. Another important educational activity of WHO is its fellowship program through which students are sent from their homeland to other countries for study and training in occupational health. Scores of specialists from dozens of countries have benefited from this program.

A third important educational activity of WHO is the organization of regional seminars dealing with specific occupational health problems.

The technical assistance program of WHO provides short-term and long-term consultants to advise governments on the organization and administration of occupational health programs

and also provides funds for equipping occupational health laboratories. Surveys to determine needs are often a part of the technical assistance programs.

Space limitations preclude a full description of WHO activities in occupational health, but it can be definitely stated that in less than a decade, WHO has achieved a position of major international importance in this field.

OTHER INTERNATIONAL ACTIVITIES

While ILO and WHO are the two leading international organizations concerned with occupational health, they by no means stand entirely alone.

A permanent International Commission on Industrial Medicine has been in existence since 1905. The sole function of this body is to organize international congresses every three years. The next will be held in New York in 1960.

The International Society for the Welfare of Cripples is actively concerned with vocational rehabilitation and, consequently, must be considered among international agencies interested in occupational health.

A number of regional organizations, such as the Pan American Sanitary Bureau, function internationally but are not global in extent, and some of these have been concerned either exclusively or partially with occupational health.

This brief résumé should be sufficient to show that those who are engaged in occupational health work fully realize the importance of international cooperation. The many countries in which the development of industry has become a part of national planning now have at their disposal substantial assistance from WHO and ILO. The trends in public health which have evolved in the industrialized nations will undoubtedly be repeated elsewhere. This means that occupational health will grow in importance and that the international agencies will be called upon for ever-increasing activity in this field.

Food and Health

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THE WORDS, "food" and "health," evoke a different reaction in each of us according to our own particular interests, knowledge, and experience. To a public health worker in the international field, these words bring to mind scenes varied in detail but usually with one common feature in the foreground—a village child who is unhealthy because he has not had enough of the right kinds of food. Recently, the figure of the urbanized adult who has had too much to eat all his life has been added. Our first thought and main concern, however, is with the under- or malnourished child and the environment in which he lives and grows so precariously.

The infant mortality rate has long been considered an index of the general level of public health and development in any region. More recently, it has been recognized that the mortality rate in the group aged 1 to 4 years is perhaps a more sensitive index of the extent of the environmental hazards which are the concern of the public-health worker. In countries where the infant mortality rates are 5 to 10 times higher than those of the economically developed countries, the mortality rates in the 1- to 4-year age group are 10 to 20 times higher than the corresponding rates in the more wealthy countries.¹ The evidence suggests that nutritional factors may play a large part in the creation of these high rates in this age group.² The task becomes one of scrutinizing the evidence, seeking the measures which seem likely to lead to a reduction in the nutritional component of the total mortality, and assisting governments to devise the means of putting these measures into operation.

In parts of the world where children suffer from lack of food, or malnutrition, the child usually shares the adult diet. Concessions to his immaturity are made in the form of omission rather than the provision of special foods. Frequently, therefore, efforts to improve the health of the child by changes in the food he consumes can best be made through improvement in the

food supply and the eating habits of the total population.

In his approach to the problem of improving child health by improving child nutrition, the international worker has the help of many people engaged in different fields of work in many parts of the world. The most difficult task is to ensure that the results of this teamwork will be accepted and used by the most important influences in the child's environment—the parents, the family, and the community of families in which he lives.

The chief obstacle to a ready acceptance is the fact that, to parents in the hungry parts of the world, the words, "food" and "health," may have meaning and implications which are not dreamed of in our philosophy. Though the relation between food and health has long been recognized and rules have been laid down in every society as to what should or should not be eaten at all times or in certain circumstances, the instructions have been mainly in the form of prohibitions for the avoidance of illness rather than injunctions for the promotion of health. "Whatsoever goeth upon the belly, and whatsoever goeth on all fours, or whatsoever hath more feet among all creeping things that creep upon the earth, them ye shall not eat . . ." (Lev. 11:42). The taboos of this type are more widely recognized than the commandments.

The health worker, heir to the scientific tradition, often finds the reasoning behind many of these ancient rules and prohibitions difficult to follow, although the actual practice may, on occasion, be justifiable scientifically. For example, in some parts of Peru pregnancy is regarded as a vulnerable state and certain foods are forbidden during this time. A pregnant woman may not eat "sleeping food"—food which has been cooked the night before and left in the pot. To the Peruvian woman the food is "cold" and, therefore, harmful to her.³ To the bacteriologically minded, this left-over food is a likely source of food poisoning, especially if eaten without reheating and, therefore, a potential danger to anyone who may eat it. In this instance, although the approach is different, the end result is the same.

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Many of these ideas seem completely incomprehensible, irrelevant, and sometimes positively harmful. The health worker slowly comes to understand that "you cannot take a modern concept like nutrition, built on the relation between food and health, and expect to find its precise counterpart in the beliefs and practices of a people living under different cultural influences from our Western society . . . (and) in order to examine a people's attitude to disease you will have to take the inevitable plunge into their *Weltanschauung* — to understand their thoughts about the nature of the universe, their ideas about the origin of good and evil, about the motive springs of human conduct."⁴

In many parts of the world, for example, it is taken for granted that intestinal worms are an inevitable part of childhood. In some Asian countries, the parents do not give the child under 4 or 5 years of age fish or eggs because these foods "cause" worms. Elsewhere, various rules exist about avoiding certain foods because they "disturb" the worms and giving others because they "draw the worms down into the stomach" where, presumably, they belong.⁵ Here, perpetuating this obvious and practically universal menace to child health, are ideas about the nature of a child, about its anatomy and physiology, about the properties of certain foods, and about curative and preventive medicine which not only perpetuate one menace, but also exacerbate another — the world-wide and serious problem of protein malnutrition in children.

The relationship between food and health has qualitative as well as quantitative aspects. In some parts of the world, the health of the population is impaired by the scarcity of all kinds of foods necessary to provide the requisite calories and nutrients. In other areas, the quality of the food is unsuitable for the maintenance of full health and particularly the health of the vulnerable groups — pregnant and lactating women and young children. In these circumstances, deficiency diseases — beri beri, pellagra, anemia, and avitaminosis A — are to be found in varying degrees of severity, complicated by the intestinal infections and infestations which abound where standards of living and environmental hygiene are low.

A great deal of attention is being given today to the form of malnutrition which occurs in young children around the time of weaning "where diets are habitually poor in protein, while they are more nearly adequate in calories."⁶

Study of the conditions which predispose and contribute to the occurrence of protein malnutrition or kwashiorkor as it is most frequently



MIR. BURGESS

called, shows how far from simple the relationship between food and health can be and how closely it is interwoven with the whole pattern of life of the community.

In many countries, for one reason or another, no milk and no food other than some parts of the normal adult diet are given to the breast-fed child to tide him over weaning. All too frequently, this adult diet is largely coarse and bulky cereal, which the child cannot consume or digest in sufficient quantity to provide himself with enough protein for his growing needs. Moreover, tradition may dictate that the males or the older members of the family have the first claim on the scarce protein delicacies in the family diet.⁷ Sometimes eggs are available, but, an egg, if sold in the market, will provide more than enough money to buy enough dried fish or cereal to feed the whole family for that day.⁸ It is therefore unlikely that the egg will be given to the insignificant and useless youngest member. This is particularly true if it is an unheard-of idea in the society that special food should be prepared or bought for a child.

Even if the family can afford to buy or use eggs for home consumption, the belief that such things are harmful in one way or another may deprive the child of this or other sources of protein, such as meat or fish. Again, the local folk medicine may rule that diarrhea, which is often part of the clinical syndrome caused by protein malnutrition, should be treated by withholding all food except a thin carbohydrate gruel. This has disastrous effects for the already protein-deficient child.⁵

Other traditional practices also have their effect on the relationship between the health and food of the young child. In some parts of Africa, it is usual for the child to be sent to live with

a grandmother or other relative for varying periods of time. This separation from the mother and other forms of maternal deprivation less dramatic, but none the less real to the child, often coincide with weaning, and it is thought they may act as a contributing factor in the onset of kwashiorkor. The anorexia which is such a constant feature of the disease may, in these cases, be an anorexia of despair caused by the child's feeling of rejection.⁹

The change from a rural agricultural life to urban industrial conditions which many people are undergoing today has its influence on the child's food and health. In the adoption of new ways of living, the rate of change is uneven and the "untoward retention of custom" which Bacon realized could be "as turbulent a thing as an innovation" may create nutritional havoc in one of two ways. Where the child in the traditional rural setting was breast fed for two or three years, it probably did not matter greatly that custom forbade that he should be given available protein in the form of fish or eggs during these early years. When the child is weaned at six months or a year because the mother has to work for a living outside the home or because the old methods of regulating pregnancies have gone with the decline of custom⁷ or the family's authority,¹⁰ the continuance of this ban on a cheap and available source of protein, such as fish, may be disastrous to the child's health. Similarly, prolonged breast feeding carried out by an isolated, overworked mother in an urban setting, relying on a meager cash income for her own and her child's nourishment, may be equally damaging to the health of her child.¹¹

The social and psychologic factors which influence the delicate balance between food and health are only beginning to be investigated in countries at varying stages of economic development, but it becomes clear from the reports already available that, although the problem changes, it remains.

While the breast-feeding mother in the African village still takes her competence for granted and is obviously justified in doing so,^{12,13} "It seems that the breast feeding mother in modern urban society often has to accept a heavy load of discomfort and disability and that this is attributable more to her way of life than to the fact of breast feeding *per se*."¹⁴

While half the world suffers from lack of food or lack of certain kinds of food, the other half is beginning to be aware that too much food, or too much of certain kinds of food, can also have a dangerous effect on health.

The diseases of plenty promise to be just as closely related to the whole pattern of life in a highly industrialized society as the diseases of scarcity are to the habits of living in the remote tropical or mountain village. What would happen to the economy of the Western World if, in the interests of longevity, the rich sauces and creamy delicacies were to disappear from the restaurant or domestic dining table, or if, in the interests of dental health, sweet candies and sticky cakes were seen no more in the shops?

More and more the public health worker, trying to raise standards of health by improving the relationship between food and health, realizes that his task touches all aspects of life and that he is indeed involved in mankind.

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Tuberculosis: A Decade in Retrospect and in Prospect

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WHEN IT BECAME APPARENT ten years ago that the long-felt need for an effective international health organization would finally be fulfilled, tuberculosis loomed as one of the major problems to be faced by the new organization. At that time, no country could claim that it was even approaching control of the disease. In some, the strenuous efforts of a generation had been largely cancelled by the war, and, in others, antituberculosis work was still no more than the dream of a few dedicated people. Of even greater consequence, the prospects for effective tuberculosis control could hardly be called promising. In most places where mortality and morbidity records were sufficient to trace its course, tuberculosis was giving way to improved standards of living and the application of a battery of laborious and not very specific clinical and public health procedures; but progress was painfully slow.

Not that the outlook in 1948 was entirely gloomy. For one thing, diagnostic procedures were becoming more precise and more effective. Cultural techniques for the examination of specimens for tubercle bacilli, for example, were being more generally used. Investigations on the sensitivity and specificity of chest roentgenography had shown that dual readings of chest films provided the most practical guide between the Scylla of missed lesions and the Charybdis of unnecessary recalls for false positives. Indications for chest surgery were being broadened with improvement in technics and development of new procedures. The number of hospital beds for the care of tuberculosis patients was increasing. And of basic importance for diagnosis and case finding, especially in the United States, the tuberculin test was rescued from disrepute by the demonstration that pulmonary calcification, once considered pathognomonic of healed

tuberculosis, was more often due to histoplasmosis than to tuberculosis in many parts of the country. In addition, three new but still unproved technics brightened the horizon: (1) the application of mass photofluorography to case finding, (2) the remarkable promise of antibiotic therapy, and (3) vaccination with BCG. However, despite occasional outbursts of optimism, it appeared that victory against tuberculosis would be won only by a long process of attrition spearheaded by finding, isolating, and treating active cases of the disease.

THE PAST DECADE

Even in retrospect, it seems doubtful that the advances in tuberculosis control actually witnessed during the last ten years could have been anticipated in 1948. Most noticeable has been the decline in tuberculosis mortality, a decline so tremendous that it would have seemed miraculous to phthisiologists of former years. Moreover, the decrease in mortality has been observed throughout the world wherever adequate records have been kept. In the economically more fortunate countries, the period of most rapid decline coincided with the decade just completed. In others, the rapid fall has been delayed, but, once started, it appears to be similar in most countries.

Reported cases of tuberculosis have also declined but much less sharply than deaths. Morbidity rates are greatly influenced by the intensity of case-finding efforts, and they have undoubtedly been increased during recent years by the widespread application of chest photofluorography. It is, therefore, probable that the true incidence of tuberculosis has been decreasing more rapidly than reports to official agencies of newly discovered cases would indicate. On the other hand, because case fatality has also decreased considerably, the incidence of disease could not have declined as rapidly as mortality. Thus, although a direct estimate is not possible, the true incidence of tuberculosis must have declined at a rate intermediate between that of

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reported cases and of tuberculosis deaths. And, the difference between incidence and mortality is probably great enough to make mortality no longer very satisfactory as the principal index of the tuberculosis problem.

More important from the epidemiologic point of view has been the dramatic decline in the risk of acquiring new tuberculous infections. A striking example is afforded in the State of Minnesota, where it is not unusual nowadays to find entire school populations that are tuberculin negative. A broader view for the United States as a whole can be drawn from the results of testing young white Navy recruits with tuberculin. In 1950, 9 per cent of them were classified as tuberculin reactors, whereas seven years later, only about 6 per cent were reactors. The implication of such findings, substantiated by tuberculin testing programs in various parts of the country, is that new infections with virulent tubercle bacilli in the white population of the United States must be approaching the low figure of 1 per 1,000 persons per year. In other countries where tuberculosis morbidity and mortality rates have also declined rapidly, the incidence of new infections must be correspondingly low. Unfortunately, widespread vaccination with BCG has made it impossible to determine the risk of infection in some countries at the present time and, probably, also for years to come.

Many factors undoubtedly have contributed to the accelerated decline in tuberculous disease and infection in recent years. The advent of the mass chest x-ray survey, made possible by developments in photofluorography, resulted in the discovery of many previously unknown cases of tuberculosis. Although the follow-up, isolation, and treatment of newly discovered cases have often been less than satisfactory, the chain of infection must have been broken at innumerable points. Moreover, dramatic demonstration of the extent of the tuberculosis problem in a community usually resulted in vast improvements in facilities for diagnosis and care. As in other public health matters, substitution of world-wide interest and attention for apathy and neglect must have been responsible for many changes that directly and indirectly reduced both the incidence and prevalence of the disease.

It is now becoming increasingly clear that the introduction and widespread use of specific anti-tuberculous therapy were probably the most potent measures contributing to these gains. Furthermore, the effective use of the new therapeutic agents was certainly accelerated by early evaluation of each agent in carefully controlled clinical trials. Never before in the history of



DR. PALMER

therapeutics has so much sound knowledge about the clinical usefulness of any drugs been gained and applied to medical practice in so short a time. That this should have been accomplished for a chronic disease, with all the difficulties imposed by chronicity, is an outstanding achievement of clinical research in recent years. The new drugs have probably also had a significance far beyond the benefits afforded to individual patients. Their ability to cause prompt and prolonged reversal of infectiousness in all except a small proportion of patients may well prove to be one of the telling blows against the tubercle bacillus in its struggle to spread from one human being to another.

Early in the last decade, in many regions of the world, primary emphasis in tuberculosis control was placed on BCG vaccination. To a large extent, this was because control facilities in many places were completely inadequate to cope with the tuberculosis problem, and BCG vaccination was found to be both administratively and economically feasible. The use of BCG was based primarily on the assumption that tuberculin reactors had acquired resistance to tuberculosis and that most of the future cases would, therefore, appear in persons who were yet to be infected. Vaccination, it was felt, substituted a safe, benign infection for the hazards of a primary infection with virulent organisms. For these reasons, millions of persons were vaccinated, a high proportion of them in the international mass BCG campaigns in Europe, Asia, and Africa. A few controlled trials of vaccination were also conducted during this period, although not in connection with the mass campaigns. While most of the trials agreed in reporting that vaccination confers some resistance against tuberculosis, there were pronounced differences in

estimates of the usefulness of vaccination in diminishing the total tuberculosis problem. It seems unfortunate that scientifically controlled trials were not made an integral part of the international BCG campaigns because, as the matter now stands, it will probably never be possible to estimate the effect of the campaigns on tuberculosis mortality and morbidity. However, as the decline in tuberculosis has been so similar in many countries without any apparent relation to the amount of vaccination that has been done, it is becoming increasingly evident that vaccination can hardly have been a significant factor in the recent changes in tuberculosis.

The mass campaigns yielded a great deal of useful information, however. Results of the extensive prevaccination tuberculin testing, for example, were reported in a fairly standardized way so that meaningful comparisons could be made of the pattern of tuberculin sensitivity from country to country. Field research, including that coordinated with the mass vaccination campaigns, showed that not all tuberculin sensitivity is specific for tuberculous infection and that the prevalence of nonspecific sensitivity varies widely in different parts of the world. While nonspecific sensitivity obviously complicates the interpretation of tuberculin reactions, the test still serves as our most satisfactory screening procedure when due attention is paid to the dose of tuberculin and other technical factors now known to influence the classification of "positives" and "negatives." Clinical and laboratory studies have also contributed in the last few years to the problem of nonspecific tuberculin sensitivity by showing that strains of acid-fast bacilli isolated from sputum and gastric specimens in some areas frequently are neither typical virulent tubercle bacilli nor nonpathogenic saprophytes but have characteristics intermediate between the two. The role of "atypical" organisms both as disease producers and as tuberculin sensitizers of human populations is currently the subject of wide and intensive study.

Students of tuberculosis have long held that the disease thrives best in populations suffering from economic deprivation and substandard hygienic conditions. Although it is impossible to assess the role of these factors in recent changes in tuberculosis, the fact cannot be denied that the problem has been less serious and improvement more pronounced in countries with more favorable socioeconomic circumstances. It is difficult to escape the conclusion that improvements in nutrition, housing, and general sanitation have played a potent and, perhaps, crucial role in these changes.

Whatever the reasons, tuberculosis in the decade just ended has finally been deprived of its rank as a leading cause of death in many countries. Fewer people are becoming ill with the disease and the widespread use of effective therapeutic agents has diminished still further the sources of infection. As a consequence, the risk of acquiring new infections appears to have become so much less in many areas of the world that the number of infected persons — the seedbed of disease — is rapidly diminishing. Viewed as a world-wide problem, however, the principal change in tuberculosis in the past decade has been a widening in the magnitude of the problem from one country to another. Tuberculosis mortality, for example, ranged ten years ago from several hundred to around 30 per 100,000, and very few countries had rates as low as 30. Today rates over 100 are still reported from some countries, but, in others, they are below 10 and, in a few, are approaching the remarkably low figure of 5. The new challenge for tuberculosis control during the next decade is, therefore, to determine what can and should be done in the increasing number of countries in which the disease can no longer be regarded as a major public health problem.

THE NEXT DECADE

There are, I believe, firm grounds for optimism about the future of tuberculosis control and for the prediction that progress throughout the world during the next decade will far surpass that made during the last. The investment of many years of clinical, laboratory, and epidemiologic research in tuberculosis is beginning to pay dividends, as are the highly developed tuberculosis control services already in operation. About the only deterrent to further rapid progress that I can foresee is that those who influence both research and service programs might be misled by the fallacy that because tuberculosis is losing its position as a major public health problem, it is no longer a serious problem.

In countries in which tuberculosis mortality and morbidity rates are still high and which also face difficult problems of nutrition, housing, sanitation, and so on, changes in the tuberculosis picture can be expected to broadly reflect improvements in the socioeconomic situation. While progress may be slow in some areas and relatively rapid in others, the rate of decline of tuberculosis undoubtedly can be accelerated by continued application of control measures that have proved useful in the past. The hope of rapid changes, however, will probably depend largely on the development and application of

practical methods for using the antituberculosis drugs. Preliminary results of studies already in progress indicate that these drugs, particularly isoniazid, may prove to be highly useful on an ambulatory basis both for patients with active infectious tuberculosis and for the large groups who are likely to become spreaders of the disease. Only time and the results of carefully executed studies can show whether the drugs will also be useful prophylactically in human populations, but it would be pessimistic indeed to doubt the promise of this new method of combating the disease.

In countries where great progress has already been made, tuberculosis work in the future will certainly differ from what it has been in the past. Not the least of the differences will be a change in objective, from control to eradication. At long last, it is not only possible but, I believe, obligatory to set the goal at eradication and not at some intermediate stage connoted by the term "control." To eradicate a serious chronic disease like tuberculosis is not a simple matter, and no one would presume to think that it can be accomplished in a decade or even in two or three. But, some of the tools and techniques for pursuing such an objective are now at hand, and others are in the process of development.

Programs directed at total population groups are too prodigal of funds and energies for countries in the eradication phase. More precise techniques must be used to pinpoint the reservoirs of disease and infection. For example, recent experience in countries with low tuberculosis rates indicates that the bulk of the new cases is now appearing in persons who have been tuberculin reactors for many years. New disease, in other words, seems to be mainly of endogenous origin and is largely concentrated in older people. Therefore, it becomes almost mandatory to focus attention on tuberculin reactors, particularly on those in the older age groups who have x-ray signs of a potentially active lesion. The least that can be done for these groups at the present time is to keep them under close surveillance, with the expectation that isoniazid or some other antimicrobial agent will prove to be an effective prophylactic. Another method of further pinpointing sources of infection would be a technique for differentiating completely healed lesions from smoldering ones that are likely to erupt eventually into active disease. Such a test would enormously simplify tuberculosis work—many patients with inactive disease could be discharged from follow-up and the few who are risks retained under close supervision. A number of competent investigators are attacking this prob-

lem with great energy, and it is by no means fanciful to expect that they will be successful.

Although the numbers of persons eligible for immunization against tuberculosis are increasing rapidly, it does not seem to me that vaccination with BCG or any other vaccine that produces tuberculin sensitivity has a place in an eradication program. The principal reason, of course is that tuberculin sensitivity produced by vaccination interferes with the identification of the infected persons in the population—those on whom tuberculosis services and preventive measures must be focused if the disease is to be eradicated. The growing sentiment in the Scandinavian countries to curtail the use of BCG undoubtedly reflects the view that vaccination has not significantly reduced their tuberculosis problem and that its continued use would only complicate the task that remains to be done. On the other hand, if a vaccine were developed which produced a highly effective and durable immunity *without producing tuberculin sensitivity*, we would have another valuable tool for advancing the day of eradication. Research on developing such a vaccine is now being carried out in a number of laboratories; but it will be difficult to find a population suitable for a trial of its effectiveness, since such a population should have a high tuberculosis rate among tuberculin nonreactors as well as adequate diagnostic and reporting facilities.

In conclusion, it seems to me that, barring a catastrophe, of course, the momentum created by successful research and the highly developed tuberculosis services already in operation will continue during the next decade to produce further significant progress, and that progress will surely be accelerated by development and application of new methods and techniques. But even if, for unforeseen reasons, the anticipated new methods should fail to materialize, the percentage decreases in indices of tuberculosis can be expected to continue their present trend. Although reductions in mortality, morbidity, and infection rates may appear most dramatic in areas in which the present rates are still high, of fundamental importance to tuberculosis workers throughout the world will be the smaller reductions in low prevalence areas because such reductions will reflect the development of successful methods for pinpointing and eradicating the last remaining sources of infection. As eradication becomes the goal of an increasing number of countries during the next decade, it seems to me not at all unlikely from present indications that by 1968 tuberculosis workers in many countries will be in actual sight of their goal.

Voluntary Agencies in International Health

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THE UNITED NATIONS and its specialized agencies, such as the World Health Organization, the United Nations International Children's Fund (UNICEF), and other official governmental international bodies concerned directly or indirectly with health problems, have stressed repeatedly the importance of the nongovernmental, or voluntary, agencies which are also concerned with health problems. For example, from the time the Tuberculosis Division of the World Health Organization was created ten years ago, it has stressed the importance of liaison with and the strengthening of the International Union Against Tuberculosis, which is a federation of voluntary national tuberculosis associations, in order to establish or improve national tuberculosis associations in various countries as a means of gaining public understanding and support for governmental tuberculosis control programs recommended by WHO.

In the UN pamphlet *The United Nations and the Non-Governmental Organization*, the manner in which people have organized themselves into voluntary organizations is commented upon as follows:

Enlightened persons who had common interests, beliefs, or ideals often organized themselves into groups in order to be in a better position to defend their interests and the principles in which they believed. A great many principles which now are generally considered to be right were thus first promoted by voluntary organizations.

During the last thirty years or more, a world network of international, voluntary, nongovernmental organizations has developed. These organizations have various major interests, such as peace, religion, politics, the arts, science, social work, education, agriculture, economics, health, and humanitarian and professional interests. All these groups of men and women represent public opinion in a substantial measure and contribute, both nationally and internationally, to the formation of this opinion in certain fields.

Provision is made by the United Nations and its specialized agencies for recognizing volun-

tary international organizations which meet certain criteria. Such a voluntary organization when officially approved is said to have "consultative status." Hundreds of organizations in different fields have been accorded this status, which has proved mutually helpful. The organizations in official consultative status to WHO have the privilege of nonvoting participation in the sessions of WHO's Executive Board and Assembly. Thus, they have the privilege of learning first hand of the development of plans of programs in various areas of public health by WHO, its regional units, and the member countries. They have the privilege of suggesting improvements in programs related to their special interests. Conversely, most of these organizations request that official observers from the WHO secretariat interested in their specific fields attend the business and scientific sessions of their own international voluntary organizations, which further helps to improve the programs of both organizations, avoids unnecessary duplication, and helps eliminate any gaps in the program which are not being met by either the official or the voluntary group.

Most of the voluntary health organizations of the United States have their international counterparts which they support both financially and with personal participation. I have already mentioned the International Union Against Tuberculosis, but there are comparable international bodies in the fields of venereal disease, poliomyelitis, heart disease, cancer, mental health, the blind, the deaf, the crippled, and other areas. There are also international voluntary professional groups, such as the World Medical Association and the International Council of Nurses. There are voluntary international organizations in more general fields, such as the League of Red Cross Societies, the International Conference on Social Work, the International Union for Child Welfare, and the International Union for Health Education of the Public. All of these organizations are assisting in the improvement of the health of people throughout the world.

In addition to these international voluntary organizations, there are national voluntary organizations specifically interested in official and

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nongovernmental international agencies. Thus, there is the National Citizens Committee for WHO here in the United States, and 10 other countries have comparable citizens' committees for WHO. There is the United States Committee of the World Medical Association and comparable committees in many other countries. There are national committees for UNICEF in the United States and Canada and in 17 countries in Europe. UNESCO (United Nations Educational, Scientific and Cultural Organization) has 70 odd national commissions, which in some instances, are semigovernmental in character. United Nations Food and Agriculture Organization, the program of which is very important to world health, has 53 national committees.

Norman Cousins has said: "No community neighborhood is smaller than the world neighborhood today in the sense that every man's welfare and destiny are interlocked with everyone else's." The national voluntary health agencies link these two neighborhoods together with their intimate contact on the one hand with every hamlet in the country and their participation on the other hand in the affairs of their respective international organizations.

Bertram Pickard, of Great Britain, has spoken of "the Greater United Nations" by which he means governmental and nongovernmental international organizations. He states:

At a time when governments are assuming increasing responsibility for the welfare of their peoples, the role of voluntary organizations necessarily shifts in emphasis. The era of soup kitchens, orphanages, and private charities is fading. Today the nongovernmental organizations have another primary objective—to be the conscience of the state and to monitor its activities in the name of the people.

In the mid-twentieth century, the "Greater United Nations" is that combination of intergovernmental and nongovernmental cooperation that strives to assure, in connection with each and every issue of international cooperation, that in no country shall national public opinion lag behind the government, while in every country the actions of the government shall be consonant with the best wishes of the people.

... Like the United Nations, the Greater United Nations is not in New York, Geneva, or the hundred and one places where international offices are established. It is everywhere, not least in the minds and hearts of "We the People," the mandatories alike of governments and organizations.

... One of the greatest opportunities of the nongovernmental organizations is to take the initiative with ideas and projects which governments are not yet ready to make their own. Here is one advantage the NGOs have over governments. The forward movement may not always come from nongovernmental sources, as we have seen. But, in matters of human relations, where pity and generosity must find full place lest the impersonality of bureaucracy and wheels of great machinery crush the human spirit, and bodies too, NGOs are better placed than governments to take account of the human factor.



DR. PERKINS

At a meeting of the Economic and Social Council of the United Nations in October 1957, it was stressed that the positive role of voluntary organizations must be emphasized. The dogma that a people's efforts were doomed to failure if they were not supported by the State was untenable. On the contrary, a society was really organizations of their own choice and direction, democratic only if its citizens themselves, through helped to mold the domestic and foreign policies of their country.

In the foreword to James Hemming's *Mankind Against the Killer*, Dr. Brock Chisholm, the first director-general of WHO, stressed the fact that microbes ignore both the national frontiers and social barriers and that the health of each of us is, therefore, dependent upon the health of all. He emphasized the fact that no agency that works across many frontiers can succeed without full public support based on knowledge and understanding of its work.

The nongovernmental organizations are in the best position to see that there is knowledge and understanding on the part of local citizens which will ensure full support of the work of the official agencies which are attempting to lessen the ravages of disease and promote optimum health.

All of this may seem a bit nebulous and impractical, so let me conclude by clarifying the discussion somewhat by indicating some of the aspects of the program of the International Union Against Tuberculosis with which I am more familiar than with the programs of some of the other international voluntary health agencies. Although still a very small organization and operating on a very small budget, the International Union Against Tuberculosis has progressively grown in scope and influence, particularly in the last ten years, until it is a definite world-

wide force in the promotion of the better control of tuberculosis. It is accomplishing its objectives by conducting international conferences every two or three years in widely different locations — Rio de Janeiro, Madrid, and New Delhi have been the last three sites — for the exchange of the latest information on treatment and prevention of tuberculosis. These conferences are not confined merely to drugs and surgery but to administrative public health problems, better methods of health education, improvement of rehabilitation services, and other areas of importance in the broad program of tuberculosis control. It has established scientific committees in specialized aspects of the tuberculosis field, composed of top experts from countries throughout the world who bring to these committees the most advanced knowledge and ideas in their particular fields. These committees gather and analyze data on important problems from countries throughout the world, and, on the basis of these analyses, formulate authoritative statements of assistance to tuberculosis workers everywhere. It has appointed regional committees in Latin America, the Middle East, and Asia to

promote the establishment of national tuberculosis associations and to improve the functions of those associations already in existence. It conducts special conferences in specialized aspects of tuberculosis control, such as on BCG vaccine and in the field of mass miniature x-rays. It designates a special observer to attend meetings of the Executive Board and Assembly of WHO and, conversely, invites the director of the tuberculosis program of WHO to attend meetings of its own executive committee and council. It enjoys official consultative status with WHO. It also maintains official liaison with the United Nations Children's Fund, one of the chief programs of which has been the control of tuberculosis among children throughout the world.

Thus, you see these programs of voluntary international organizations are not indefinite and nebulous concepts but practical, worthwhile efforts which slowly, perhaps, but surely exert a favorable influence in accelerating the objective of ridding man of disease and helping him attain the maximum physical, mental, and social well-being which the WHO charter has laid down as the right of every human being.

THERE ARE NOW 1,236,000 physicians serving the world's 2,700,000,000 inhabitants, and the 638 medical schools operating in 85 countries graduate annually about 67,000 physicians. Fourteen countries are fortunate enough to have 1 doctor to serve every 1,000 or fewer persons. However, in 22 other countries, there is only 1 doctor for 20,000 or more inhabitants. Between these two extremes, the rest of the world shows great variations. Usually, there is a shortage in rural areas, while cities are apt to have an overabundance of medical practitioners. While 9 countries have 1 medical school for less than 1,000,000 people, 13 countries have only 1 such school for 9,000,000 to 17,000,000 people.

The Contribution of the Hospital to the Improvement of Health

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ALL OF US in the health field are aware of the changes the past has brought to the role the hospital plays in the improvement of health throughout the world. Representing man's devotion to the welfare of all mankind, the modern hospital is one of the outstanding constructive achievements of civilization.

Feudal hospitals, built and staffed by religious orders, had a twofold objective — salvation of the soul and care of the body. The hospital was a simple institution with surgical facilities as crude as the art of surgery itself. Equipment for diagnosis and therapy was unknown, and care of the sick was primarily custodial. Early hospitals in the United States were pesthouses or quarantine stations for persons with contagious diseases, almshouses for the indigent and insane, or empty buildings taken over to shelter the homeless sick for emergency and terminal care. During the greater part of the nineteenth century, most people viewed the hospital simply as a place to die.

The late nineteenth and early twentieth centuries constituted a period of social and economic reform, much of it in the wake of advances in medical science. Between 1850 and 1900, great advances were made in biology, cellular pathology, bacteriology, clinical microscopy, and physiology. In the United States, the Pure Food and Drug Act was passed; the National Association for Mental Health was established; sanitary engineering received increased attention; and new public health laws were enacted.

In 1910, the Flexner Report set fundamental standards for medical schools, stressing the need for full-time faculties in the basic sciences and clinical training in hospitals. The rise in medical standards brought demands for better hospitals, personnel, and equipment. As standards advanced and hospital mortality rates dropped, there was a change in attitude of the public toward the hospital. It was now pictured as a place in which the individual who was ill had a

better chance for recovery and relief from pain. Its function had shifted from that of terminal care for the poor to that of a complex organization designed to bring the greatest potential of medicine to all.

There is presently underway a revolution in hospital care. A variety of developments, consisting in part of the use of new and complicated equipment, different treatment technics, and new categories of highly trained, specialized personnel, have changed the picture of hospital care even in the past two generations. These years were notable for the evolution of the science of roentgenology, the isolation of insulin for diabetes, the use of liver in pernicious anemia, elimination of many of the infectious diseases, the inception of cardiac catheterization and heart surgery, and the discovery of sulfa drugs and the antibiotics. New anesthetics have made heretofore impossible surgical procedures feasible; the utilization of radioactive isotopes points to the probability of conquering illnesses previously thought incurable. Many of these discoveries were made in hospitals or were perfected by hospital research to the point at which they are used in saving human life.

Through the modern hospital, doctors have been able to improve medical care and to make it available to more people. There is no magic in modern-day medicine. When it is good, it is good because it consists of tested methods which were arrived at through research and experimentation. It is largely through the hospital that the medical profession integrates into its knowledge and practices the findings of other sciences.

For a long time, the hospital stood alone as an island of curative medicine. Within its realm, it did, in many instances, a superb job. It has ceased, however, to be an island by itself and has become a part of the mainland of medical care. Increasingly, it is recognized as the center of community health; its future role will emphasize prevention and rehabilitation as well as diagnosis and treatment. As early as 1936, the Committee on Public Health Relations of the American Hospital Association went on record

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as saying that the gradual disappearance of the line of demarcation between the prevention and the treatment of disease was one of the new concepts to be emphasized in an adequate community health program.

The hospital has felt the impact of dramatic economic and social developments, one aspect of which is the increasing appreciation of the value of good health. New ideas of the responsibility of employers, of unions, and of government at all levels for the maintenance of physical well-being have thrown the hospital into focus as a point from which health care and information can be disseminated. More than twenty-five years ago, hospitals realized that new ways must be devised to help people budget in advance for their hospital care. The voluntary, nonprofit Blue Cross Plans were the answer. Today there are more than 55 million Blue Cross subscribers. The plans make direct payments to the hospitals for the care provided their members, with emphasis on the services the patient needs rather than on the dollars paid. An additional 65 million individuals are insured through commercial hospitalization insurance programs.

As a community health center, the hospital assists the health department in birth and death registrations, the detection and reporting of communicable disease, and the treatment of poliomyelitis and tuberculosis patients in a ceaseless fight against infection. In rural areas in particular, the health department may use the hospital's clinical and laboratory facilities. Many hospitals are inaugurating or improving community educational plans in maternal and child welfare, sex education, nutrition, mental hygiene, and early perception of serious illnesses. The closest cooperation between the hospital and health department is found in outpatient work.

Hospital operation has changed rapidly without planned development based on research. However, recent Public Health Service grants have made possible research on many subjects including hospital licensure, the future need for facilities, institutional design and construction, and many other vital topics.

The program of hospital accreditation, with surveys of hospitals made only after request of the hospitals themselves, helps to maintain high standards of patient care. The stamp of approval conferred by the Joint Commission on Accreditation of Hospitals—a body sponsored by the American College of Physicians, the American College of Surgeons, the American Hospital Association, the American Medical Association, and the Canadian Medical Association—tells the



DR. CROSBY

community that the institution has been inspected and is well run, well organized, well equipped, and well staffed.

These are a few of the ways the hospital contributes to the betterment of health. For the future, there are four ways of extending health services into the community through which even better care can be afforded to all:

1. There is a need for better-planned cooperation between large and small hospitals in order that difficult cases can be referred to centers with specialized facilities and so the specialists from central hospitals can regularly visit smaller institutions. There should be a carefully developed plan in each community to establish cooperation among health and welfare agencies and other institutions offering related services.

2. New rehabilitation programs should be provided in view of the knowledge that rehabilitation is a vital part of the dynamic therapeutic picture. The patients of several hospitals in a given area might well be served by a centrally situated rehabilitation center.

3. The illnesses that beset the aging, a group growing in numbers, present another challenge to hospitals. Much of middle- and old-age sickness is chronic in nature, necessitating hospitalization of relatively short duration. Arrangements will have to be made for continued home care and for an adaptation of the full range of services now available only to the hospital inpatient.

4. Another area of expanding hospital service is found in outpatient care. The idea of ambulatory service for the community is gradually being accepted. In the interest of good community health, it seems probable that more hospital prepayment plans will offer coverage for outpatients and for diagnostic technics.

Heart Disease—A World Health Problem

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IN RECENT YEARS, heart disease has been appearing as the cause of death on the death certificate with greater and greater frequency. At the same time, deaths caused by tuberculosis and the contagious diseases are diminishing.

Heart disease today knows no international boundaries. However, for all its magnitude and scope, it suffers from a lack of world-wide investigation. This is in sharp contrast to the infectious diseases which have inflicted the world for so many years. Quite logically, these diseases have been studied and are being controlled first, while heart disease and cancer have not. Within a generation or so, depending upon how rapidly the infectious diseases are controlled, heart disease and cancer very likely may head the list of world-health enemies. When one considers for a moment the statistics available from just 7 nations, the emergence of heart disease as a world problem is evident. In 1954, the United States, Finland, Australia, the United Kingdom, New Zealand, Canada, and Switzerland reported deaths due to arteriosclerotic and degenerative heart diseases at a rate in excess of 600 per 100,000 population.¹

International cooperation and world-wide study have become a matter of routine in dealing with widespread diseases like malaria, leprosy, and tuberculosis. The pioneer work of the Rockefeller Foundation and the World Health Organization, transcending international boundaries, has broken the ground and shown the way. Such footsteps might well be followed in gathering further information about diseases such as rheumatic fever, hypertension, and arteriosclerosis. Also, pioneering efforts might well be made to collect information on the incidence and severity of heart disease under a complexity of conditions and in every corner of the earth. For centuries, nature has been conducting gigantic experiments involving differences of climate, altitude, type of

work, and differences of diet on people of different races. This canvas is spread before our eyes to record and to analyze.

Laboratory animal experimentation has yielded significant clues which have led to important discoveries, yet, if we place our sole reliance on such experiments, we are in effect neglecting a valuable source of information about cardiovascular diseases. Animal experiments, even under the most exacting conditions, cannot be completely applied to man. Human reasoning has enabled man, for example, to institute major changes in his environment. This has served to remove various possibilities of paralleling animal adaptations to those of human beings.

Surveys both here and abroad are slowly accumulating information, but this is a slow process. Also, lack of comparability of data often makes meaningful interpretations impossible. We need well-organized studies that can collect clinical and pathologic information on heart disease over several years, not just from hospital clinics and private practice but from entire communities. By these means we can learn more about host and environmental factors related to hypertension, rheumatic fever, and coronary heart disease. Challenge and hope lie in the simple fact that the morbidity and mortality from heart disease differ with populations and countries. What we learn about the Bantu, the Japanese, and the Italians becomes a challenge to us in the United States and in Northern Europe.

Present knowledge of heart disease incidence and mortality in different populations and population segments is rudimentary. We look for some of the answers in vital statistics, but much of the desired data is missing or incomplete and what is available must be carefully analyzed. Wartime experience of the Scandinavian countries has demonstrated quite clearly that the problems of arteriosclerotic heart disease in a given population can change in as short a time as a year or two.

International action has begun on world public health problems involving heart disease. Members of groups such as the International Society of Cardiology, the International Congress of Internal Medicine, and the World Health Or-

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ganization have been attempting to meet the universal heart disease problem since World War II.

The third Regional World Health Organization Conference of Europe, meeting in Copenhagen in 1953, recognized cardiovascular disease as a public health problem of international concern and recommended that a study group be organized to stimulate further action in this field. In 1954, the Food and Agriculture Organization and the WHO Expert Committee on Nutrition proposed that WHO give consideration to the possible relationship between the character and the amount of habitual diet and the development of atherosclerosis.

As a result, a special meeting of a Study Group on Atherosclerosis and Ischemic Heart Disease was held in Geneva in November 1955. This international group (knowledgeable in cardiology, pathology, physiology, biochemistry, epidemiology, nutrition, biometrics, and public health) considered many aspects of the over-all problem of atherosclerosis and reported its recommendations to WHO. The report has a valuable documentation of the needs and recommendations for further research and international cooperation.²

Interest in such cooperative efforts has grown, and tangible results are beginning to be evident. In the fall of 1957, an international group of pathologists met in Washington, D. C. with the support of a National Heart Institute grant and drew up and adopted a classification of atherosclerotic lesions found at autopsy. This system of classification will be recommended to WHO for adoption throughout the world. Such uniform classification of autopsy findings would be especially valuable in comparative epidemiologic studies of atherosclerosis in different countries. Such comparative studies are already under way in some South American countries, and there is indication that they will expand to other areas.

A decrease in the mortality of rheumatic fever and rheumatic heart disease in certain countries has occurred during the last few decades. Nevertheless, they continue as an important cause of morbidity and mortality among children and young adults in many parts of the world. Available statistics underestimate the total morbidity attributable to rheumatic fever and rheumatic heart disease, since many patients survive the initial attack of rheumatic fever and develop trouble from their valvular disease only in later years. Evidence of the effectiveness of rheumatic fever prevention measures has accumulated to a point where preventive action on a world basis is both justified and needed.



DR. VAN SLYKE

In addition to the needs for standardization of both clinical and pathologic criteria and terminology in respect to atherosclerosis, coronary heart disease, and related conditions and for further agreement with respect to methods of examining, assessing, and reporting on necropsies with particular regard to coronary artery and myocardial lesions, uniform criteria should be established for the clinical diagnosis and classification of cardiovascular diseases in a manner which will be applicable to epidemiologic and other statistical studies. Also, attempts should be instituted to achieve comparability in pertinent laboratory estimations of serum cholesterol and cholesterol-bearing lipoproteins.

There is a scarcity of available data that are of special interest from many populations. Existing data usually are inadequate in several respects. For example, dietary information is generally collected on a family basis, even though the results are expressed in terms of per consumption unit. It is essential to have data on personal food habits so that the diets of persons in different age groups, especially of men and women in middle age and beyond, can be ascertained. The nature and source of specific food constituents in the diet present another area where information is sorely needed, though significant work has been begun and is continuing in this area.

FAO is making a valuable contribution toward meeting some of these needs by assembling and providing appropriate data on food consumption following the recommendations of the Joint FAO/WHO Expert Committee on Nutrition. FAO should be encouraged to continue the stimulation of well-planned dietary surveys to obtain as soon as possible this needed information on diet for different parts of the world.

The Joint FAO/WHO Expert Committee on Nutrition already has drawn attention to the fact that malnutrition from excessive consumption of food with resulting obesity is becoming an important world health problem. Since coronary heart disease may be in some way associated with the excessive consumption of certain foods or nutrients, it is desirable for international agencies, as well as for the national organizations concerned with these problems, to explore the question of maximum limits for the requirements of calories and nutrients, including fats.

Possible preventive methods must be justified. Great hope for revealing new factors concerned with prevention lies in the field of epidemiology. Studies already in progress are evidence of the potentialities of the epidemiologic approach to these problems.

The needs shown in epidemiology are but a sample of the whole critical problem which must be met if we are to focus on heart disease as a world health problem to any meaningful degree.

A genuine threat to the future of all medical research has arisen largely because of the inadequate attention to the training of manpower for the years ahead. Support of medical research cannot be divorced from research manpower and from the strength of the institutions which train research manpower. It is manifest that concentration upon support of current research—necessary and valuable as it is—has not been accompanied by enough attention to all of the factors entering into the production and maintenance of a larger international pool of highly qualified medical research scientists.

In the field of coronary heart disease in particular and of the metabolic and noninfectious diseases in general, there is a shortage of experienced researchers who are familiar with social and clinical problems as well as epidemiologic methods. One clear and positive step can be taken to ameliorate this situation. The furtherance of postgraduate training in appropriate centers should be encouraged. This can be achieved by (1) drawing attention to the importance of encouraging and promoting work in this field; (2) identifying host and environmental situations that offer special opportunities for study, including populations undergoing rapid social change and populations with apparently great contrasts in experience with heart disease; and (3) making available qualified consultants to assist in the design of surveys and in the analysis of the results.

Steps to resolve these problems are among the most urgently needed in the whole field of medical research in order to give the world an ade-

quately balanced total medical research program. Well-trained scientists are the most important single factor in determining whether or not progress is made over the years to come in the continuing war on heart disease.

Money and facilities are urgently needed. A way must be found to provide them. In many universities, medical schools, and other related research institutions, the absence of adequate laboratory space is the most important single cause restricting the volume and kind of medical research that must be undertaken. The financial status of medical schools is such that very few can undertake construction of buildings from their own funds or from private gifts.

Progress in the conquest of disease depends to a very large extent on an uninhibited flow of communications between the physician and the investigator. Vast problems exist in opening and keeping open these channels of communication.

A more extensive exchange of information demands our attention. There needs to be a more widespread exchange of experience among workers interested in the problem of heart disease from different parts of the world. Attendance at meetings, congresses, symposia, and conferences is one of the most effective means of communication among scientists. Most private and governmental research-supporting organizations recognize their great value, and grants in support of research usually provide small amounts of money for travel assistance. If there is to be hope for any real cross-fertilization of the minds and for significant improvement of public health, it is important that the men working in this area have funds sufficient to attend these scientific meetings. This is one of the most important ways in which they can bring knowledge back to their own countries and have it shared for national benefit.

Research workers in foreign institutions receive National Heart Institute support to carry out investigations of problems unique to their countries yet extremely valuable to heart research as a whole. The investigation of atherosclerosis among the Bantu in South Africa is but one example.

Scientists from the United States, supported by National Heart Institute fellowships, work in many of the research centers of other countries learning and exchanging their knowledge and skills. In a similar pattern, scientists from other countries are coming to America to share their experiences with us and to gain knowledge which will broaden the medical talents of their homelands. Beneficial expansion of such valuable programs should be encouraged in many

fields since important advances in medical research are being made in many countries which will be of benefit to all.

The results of experiments already being done in a few countries that have health programs aimed at the prevention, early detection, and control of heart disease are important to all of us. The outcome of these studies and additional research may soon suggest more effective preventive programs to health authorities.

Leadership should be provided to create a mechanism of pooled support for training skilled researchers. Existing research facilities require

improvement. Additional facilities should be constructed. The exchange of medical information should be extended and broadened.

WHO might suitably assist in planning and coordinating the development of certain international research efforts which it would be uniquely qualified to foster. Group support for a program such as this would return ultimately to each member nation a positive dividend in the form of improved national health. This is true just as surely as the present interchange of scientists, limited though it is, mutually increases national research skills.

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THE DECLINE IN MORTALITY is the most significant demographic event of the last decade. In the world as a whole, death rates for 1950 to 1954 were lower than those for 1945 to 1949, and countries with the highest death rates in the earlier period experienced the greatest reduction.

The decline may be attributed in the main to advances in environmental sanitation and disease control, and it is reflected in increased life expectancy almost everywhere. In the more developed countries, a newborn girl can be expected to live four to five years longer than ten years ago and a newborn boy three to four years longer. In some of the countries undergoing rapid development, life expectancy at birth has increased to eleven years for girls and ten years for boys.

With a decreasing rate of death and an almost unchanged birth rate, the population of the world — now about 2,700,000,000 — is growing rapidly. Every hour almost 5,000 persons are born, or 120,000 per day, or 43,000,000 per year — an increase calculated to double the world's population by the end of the century.

Progress in the Control of Cancer

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DEATHS AND DEATH RATES from cancer have been increasing so steadily over the past half century that one might well question the justification of an article entitled "Progress in the Control of Cancer."

From the position of eighth among the causes of death in this country in 1900, cancer has now risen to the second position. This increase has been due mainly to factors such as the control of communicable diseases and the increasing age of the population. Whatever the causes, the fact is that in 1957 a quarter of a million persons in the United States died from cancer.

Fortunately, this is not the complete story. An analysis of cancer deaths shows that in recent years, the death rates for certain age groups and sites of origin have not increased; in some instances, they have actually decreased. For example, over the past twenty years cancer death rates among women 25 through 84 have decreased. Overbalancing these decreases, however, have been the substantial increases among men aged 45 and over (figure 1).

When analyzed according to sites of origin, cancer death rates show varying trends (figure 2). Lung cancer has shown a steady and impressive increase. Some of this may be attributed to better diagnosis and reporting, but it is believed that a large part represents a real increase in incidence. While increases have been recorded also for leukemias and cancers of the pancreas and ovary, notable decreases have been noted for cancers of the uterus, skin, and buccal cavity. Incidence of cancers of the liver and stomach has declined. In the case of the liver, the increasing recognition of secondary cancers of the liver and proper assignment of these cases to the primary site of cancer would account for the decline. For stomach cancer, the decline

is perhaps due partly to more precise specification of internal cancers. This decline may, however, indicate a real decrease in the incidence of this form of cancer.

Over-all, these data point to the areas toward which our greatest future efforts should be directed. They show that, although the problem is not simple, progress can and is being made.

Another measure of accomplishment in dealing with cancer is the proportion of patients whose lives can be saved or substantially prolonged by appropriate treatment. Here again we find some basis for gratification and encouragement. Twenty years ago, the American Cancer Society estimated that 1 out of 7 patients diagnosed as having cancer was saved. Ten years ago, the figure rose to 1 out of 4, and, now, the statistics are 1 out of 3.

Such achievements to date and our hopes for the future rest primarily upon research to provide more effective measures of prevention, early diagnosis, and treatment, together with programs designed to obtain the widest possible utilization of measures of demonstrated value.

CANCER RESEARCH

Major research efforts in the field of cancer date back little more than a decade. Yet, during this period, substantial progress has been made not only in advancing scientific knowledge regarding cancer but also in the training of research personnel and the provision of facilities to enable them to work effectively.

Among the definitive research achievements directly applicable to cancer control are:

1. The development of exfoliative cytology as an aid in the early detection of cancer, particularly of the female genital tract.
2. The utilization of radioactive chemicals for the diagnosis and treatment of cancer.
3. Improvements in surgical and supportive surgical techniques and services which make possible more extensive and prolonged operative procedures.
4. The employment of various chemicals and certain endocrines, such as estrogens, androgens, ACTH, and cortisone, for treatment. The effects of most of these are temporary and palliative,

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but a few result in prolonged and possibly permanent improvement.

5. Substantial additions to scientific knowledge regarding basic biologic and chemical processes that are related to the cancer process.

Of greater importance than the research accomplishments to date are the potentialities which have been developed for productive research in the future. In 1944, the total amount of money expended throughout the country for research on cancer was a mere \$500,000. By 1957, this total increased to substantially more than \$50,000,000. These funds make it possible for thousands of investigators with worthy cancer research projects to be supported. Furthermore, the availability of adequate support, some of which is on a long-term basis, encourages scientists to devote themselves to work on the cancer problem.

To increase further research potential, both the American Cancer Society and the National Cancer Institute have for some years been sponsoring various types of research fellowships to promising young investigators. Currently, approximately 200 young scientists each year are completing programs of advanced training in some aspects of cancer research. Some of these are supported as independent investigators for a limited number of years and a few for the duration of their scientific careers in order that they may devote their entire efforts to cancer research.

Current support for cancer research covers practically every possible approach to the study of this disease—chemotherapy, epidemiology, virology, immunology, genetics, biology, and biochemistry as well as the uses of hormones, isotopes, radiation, and surgery. From one or a combination of these research efforts, there is solid justification for a hopeful optimism that early discoveries will provide the information necessary for the prevention or cure of cancer.

CANCER CONTROL

The second aspect of a program for the control of cancer is to secure the utilization of effective available measures for its prevention and treatment. It was pointed out earlier that 1 out of 3 persons who are diagnosed as having cancer now will be saved as compared to 1 out of 4 ten years ago. In total numbers, this means that of the approximately 450,000 persons who last year were diagnosed by physicians as having cancer, 150,000 will be saved. This is some 38,000 more than would have survived ten years ago. This is a magnificent achievement. Yet, it is estimated that with the knowledge currently



DR. DIEHL

available, it should be possible to increase the cure rate to 1 in 2—an improvement which would mean the saving of approximately 75,000 more lives annually.

Consideration of the deaths from various types of cancer focuses attention upon some specific possibilities for the prevention of unnecessary deaths. For example, the death rates for cancer of the lung of males 50 to 70 years of age are 50 times as high among smokers using one pack or more per day as among nonsmokers. After discontinuing smoking for ten or more years, the death rates among heavy smokers was 62 per cent less than among a similar group who continued smoking.

In 1957, 12,000 women died from cancer of the cervix. Such deaths are practically all preventable if the disease is diagnosed early and then adequately treated. Specialists in this field believe that the widespread use of exfoliative cytology examinations could lead to the diagnosis of practically all of these cancers while in the curable stage.

Cancer of the breast—another major cause of cancer deaths among women—last year took the lives of 22,000 women in the United States. Yet, in most cases, this disease too can be diagnosed while still a local lesion susceptible to complete removal by surgery.

How can such unnecessary deaths be prevented? Obviously, by earlier diagnosis followed by adequate treatment. Early diagnosis and adequate treatment depend in part upon the medical profession and in part upon the public.

The public must be informed about the relationships of cancers to cigarette smoking, to certain moles, to chronic irritation, and to certain other conditions. They must learn the symptoms which may be suggestive of cancer—the so-

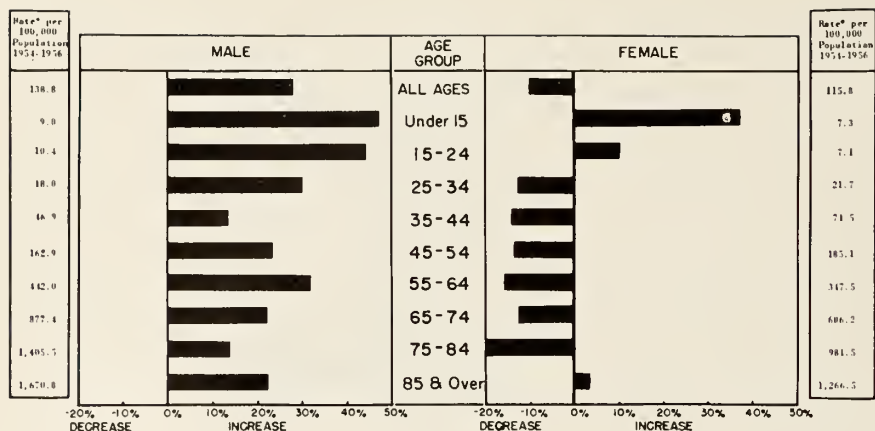


Fig. 1. Per cent change in cancer death rates by age and sex in United States from 1934-1936 to 1954-1956. Asterisk refers to standardized rate for age on the 1940 United States Census. Source: National Office of Vital Statistics and United States Bureau of the Census.

Fig. 2. Per cent change in cancer death rates by site in United States from 1934-1936 to 1954-1956. Asterisk refers to rate per 100,000 population standardized for age on 1940 United States Census. Source: National Office of Vital Statistics and United States Bureau of the Census.

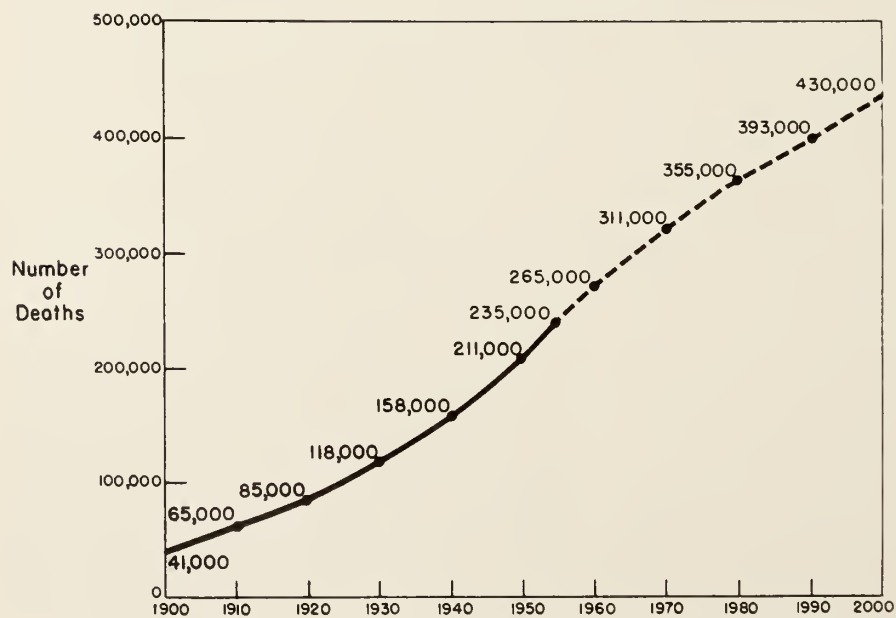
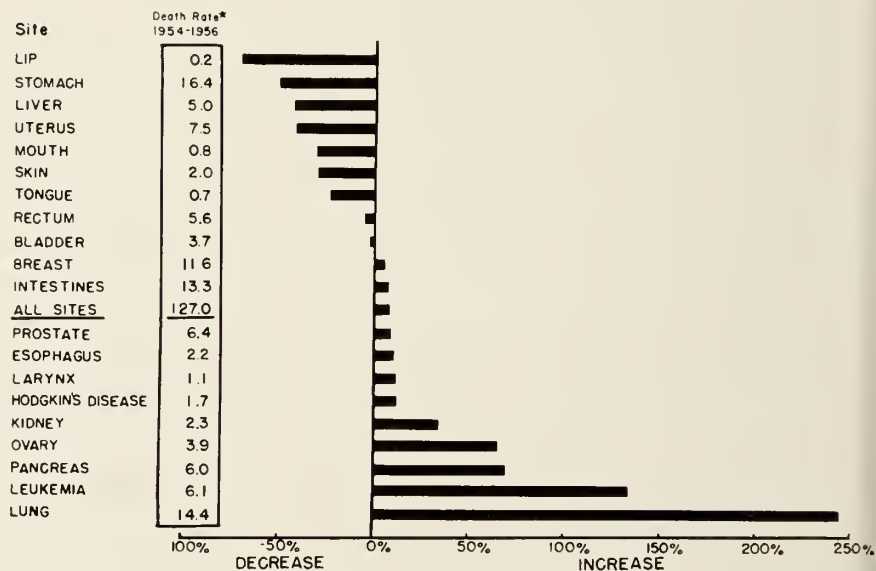


Fig. 3. Forecast of cancer deaths if present rates continue.

called Seven Danger Signals of the American Cancer Society:

1. Unusual bleeding or discharge.
2. A lump or thickening in the breast or elsewhere.
3. A sore that does not heal.
4. Persistent change in bowel or bladder habits.
5. Persistent hoarseness or cough.
6. Persistent indigestion or difficulty in swallowing.
7. Change in a wart or mole.

They must present themselves to physicians promptly when these symptoms occur in addition to having regular, complete physical examinations with special attention to those areas of the body particularly susceptible to cancer.

The American Cancer Society's programs of public education utilize every available communication medium to reach the public with pertinent information about cancer. A generation ago, cancer was an almost unmentionable disease. Today a large proportion of the population speaks freely of cancer, has some understanding of it, and has some knowledge of the "Danger Signals."

Interest in and knowledge about cancer on the part of the medical and related health professions also have increased substantially in recent years. Examination techniques and procedures for early diagnosis are widely employed. Problems of treatment are approached with skill and optimism, and adequate facilities for diagnosis and treatment are becoming increasingly available.

All of this adds up to substantial progress in

cancer control; yet, much more remains to be done. Even if research discoveries should provide completely effective measures of prevention, early diagnosis and treatment today, there would be a substantial and, in many instances, a tragic time lapse before these measures would be generally applied for the benefit of the public.

PROSPECTS FOR THE FUTURE

Estimates by the Statistical Department of the American Cancer Society indicate that, if present cancer attack rates continue, by the year 2000, over a million persons in this country will be suffering from cancer and 430,000 will be dying annually (figure 3). This staggering prospect emphasizes the urgency of still more intensive and extensive efforts both in research and in the effective utilization of available knowledge.

Fortunately, the groundwork has been laid and the facilities, personnel, and organizations are available for more rapid progress in these areas than has been true in the past. To capitalize on these, the devoted and continuing participation and support of research workers, the medical and allied professions, health agencies and organizations, and the public is essential. With these assured, we can look forward with real optimism to the more effective control and, we hope, the ultimate prevention of this dread disease.

Data supplied and graphs prepared by the Statistical Department of the American Cancer Society.

HEART DISEASE AND CANCER not only rank highest as causes of death in most of the highly-developed countries, but they are increasing.

In England and Wales, for example, deaths from cancer in 1947 accounted for 15.1 per cent of all deaths, but by 1955, the percentage had risen to 17.6. Denmark showed an increase from 16.2 per cent in 1947 to 21.8 per cent in 1955, and the United States had an increase from 4.7 to 15.7 per cent.

Deaths from degenerative disease of the heart and arteries are also increasing. Among the possible causes is the aging of the population and consequent swelling in the 40-to-80 age group in which these diseases are most prevalent. Also, diagnostic techniques have improved, decreasing the number of deaths formerly attributed to "senility" or to "unknown causes."

Animal Health Problems: A Challenge to Public Health

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HUMAN AND ANIMAL HEALTH have been inter-related since the beginning of medical knowledge. Four thousand years ago, the Babylonian records spoke of the doctors of domestic animals and of how important their efforts were in maintaining the health of the animals on which trade and transportation depended. The Egyptians likewise realized the importance of animal health to their society in providing power, transportation, and food. The priest doctors practiced their arts both on man and animals. It is probably not too far-fetched to suggest that the practical knowledge of animal diseases in ancient times exceeded that of human diseases because human medicine was inextricably bound up with the supernatural.

During the Hippocratic period, knowledge of animal diseases and their effect on public health was notably enlarged. The Greek physicians of this period were the first to describe rabies, anthrax, and glanders accurately. Their curiosity about diseases in dogs, oxen, and horses laid the basis of comparative and veterinary medicine for nearly a millennium. They were the first to examine the organs of diseased animals and attempt to relate these observations with clinical signs. These examinations led to the formulation of a pseudoscientific basis for all medicine.

Galen, the most famous of the Greek physicians in the Roman period, developed preventive medicine and military medicine and was informed on animal-disease problems. His recommendations on the control and prevention of glanders among military horses by isolation are still interesting reading to those responsible for animal health. He established the first animal hospitals as a part of the Roman military medical

program. Animal quarantine also received his attention and was applied to all types of animals that were being returned to Rome from the conquered provinces. All of these services were under the supervision of veterinarians who were a part of the Roman army medical services. After the fall of Rome, the practice of veterinary medicine disappeared as an art except among the Arabic physicians who took the Roman knowledge and gradually enlarged it. They were quite successful in preventing widespread epizootics among their animals. Lost in antiquity is the origin of vaccination, but it is amazing to find that Arabic shepherds hundreds of years ago practiced variolation among their sheep flocks to control sheep pox, one of the most contagious and serious animal plagues. After the Moors conquered Spain, they set up veterinary training in the various ruling centers. Later, when the Spanish took over, the Arabic veterinarians and farriers were retained.

Modern veterinary medicine did not become established until the middle of the eighteenth century when the first school or faculty was founded in Lyon, France. This was followed within a few decades by veterinary schools all over western Europe. It was almost a hundred years before the first veterinary school was established in the United States in the 1850's.

The late nineteenth century was a period of rapid development in human, comparative, and veterinary medicine. The infectious disease theory and subsequent discoveries in bacteriology provided new tools for the epidemiologists and public health scientists. The advancements in the new science of nutrition in human and animal feeding made society more cognizant of the value of their animals. Later, the tremendous expansion of industry and agriculture with the resulting need for animal power had a very stimulating though short-lived effect on veterinary medical education. The subsequent replacement of animal power with mechanical power throughout the world revolutionized veterinary medical education and research.

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The objective of modern veterinary medicine is the protection of animal and human health. These services are of incalculable value to human welfare. There are more than 200 infectious diseases of animals, nearly half of which are communicable to man under certain conditions.¹ The number of noninfectious chronic diseases with which animals are plagued is also in the hundreds. The impact of panzootics and epizootics, or the effect of enzootic disease on the present world, is forcefully brought to the attention of man by periodic disease eruptions of such ancient plagues as rinderpest in Asia, foot and mouth disease in Europe, contagious pleuropneumonia in Australia, trypanosomiasis in Africa, brucellosis or tuberculosis in South America, and anthrax and hog cholera in North America. An accurate estimate of their effect is difficult because of the paucity of data on animal morbidity and mortality and on human diseases and death due to animal diseases. Nevertheless, there are some problems which can be used to illustrate the world wide impact of the zoonoses—tuberculosis, brucellosis, rabies, hydatidosis, and rinderpest.

BOVINE TUBERCULOSIS

Bovine tuberculosis was the first animal disease to be recognized as a public health problem. The identification of the etiologic agent and its effect upon human health dramatized its importance better than any other zoonotic disease. Fifty years ago, tuberculosis of man and especially of children was frequently found to be of bovine origin. In the United States, the *Mycobacterium tuberculosis bovis* was stated to be the cause of 5 to 10 per cent of all the tuberculosis seen in man and as high as 30 per cent of the disease in children. Estimates of infection rates in animals varied, but generally it was estimated that 5 to 10 per cent of the cattle were tuberculous. In some areas, infection rates exceeded 25 per cent and ranged occasionally up to 50 per cent. This situation required action. Public health and animal health officials throughout the nation demanded that this disease be eliminated. American medical journals and publications of this period carried innumerable reports about the disease. Many communities passed regulations requiring that all milch animals producing milk for their market should be tested for tuberculosis. Minneapolis, your host city, was one of the first to adopt an animal tuberculosis testing requirement. Later, when pasteurization became mandatory, the incidence of bovine tuberculosis in children and adults dropped dramatically in urban areas. In the rural sections, however, the



DR. STEELE

disease continued to be a smoldering health problem which crippled children and adults developing overt cases.

In 1917, the United States government inaugurated a national bovine tuberculosis eradication plan. The plan provided that every bovine animal in the country was to be subjected to tuberculin tests and those that reacted were to be removed from the herd and slaughtered. All slaughtered animals were subjected to veterinary meat inspection to determine the extent of the disease and to determine whether or not any portions of the carcasses could be used for human food. The owners of the animals were reimbursed in part for their losses by the federal and state governments.

Within a few years, the benefits from the program were realized. By 1940, the estimated infection rate had been reduced to less than 0.5 per cent of cattle tested, which was a reduction of probably more than 90 per cent. Today the incidence of infection in tested cattle is even lower—0.15 per cent. Bovine tuberculosis is no longer an important public health or economic problem in the United States.

The cost of this campaign has been estimated to have been about 300 million dollars. This is only a fraction of what the costs would have been in loss of animal products, meat, milk, and so forth, if the disease had continued at its 1917 rate for the past 40 years. The monies saved in animals and animal products alone would total many billion dollars. The elimination of bovine tuberculosis as an important childhood disease cannot be measured. Since 1950, only one proved case of bovine tuberculosis in children has been reported. Few human cases of bovine type tuberculosis have been found in adults during recent years, and those that have been found

are usually occupational infections or breakdown of old lesions.

It is well to point out that this favorable progress in the control of animal tuberculosis is not confined to the United States. Canada has reduced the disease considerably, and, in some areas, it has been eradicated. Norway, Sweden, Finland, and Denmark have all but eradicated the disease. Finland, in 1955, reported that the tuberculin reaction rate in cattle was 1 in 10,000, and investigation of these cases revealed that they were due to contact with either human or avian type bacilli.

Great Britain and Holland have also made considerable progress. The Dutch plan is of special interest inasmuch as it was a joint program of the health and agriculture ministries to conquer the disease. In attacking their problem, the Dutch authorities had veterinarians and physicians test the animals and the people on the farms at the same time. They have drastically reduced the prevalence of the disease in both animals and man in the rural areas.

Reports from France, Germany, Switzerland, and Austria indicate that they have undertaken animal tuberculosis eradication campaigns. Campaigns are also under way in Australia and New Zealand.

Regardless of the success that has been achieved, bovine tuberculosis is still a challenge to be met and vanquished in many parts of the world. The elimination of this disease will contribute much to the advancement of the well-being of man. The increase in animal food products alone will pay for the cost of a program. The public health benefits are such that no country can afford not to attack the disease.

BRUCELLOSIS

This entity is probably more widespread than any other animal disease on earth. It affects more sheep, goats, and cattle than any other animal plague. It is also the most important animal disease communicable to man. Persons ill with this disease throughout the world are numbered in hundreds of thousands. Until the advent of the broad-spectrum antibiotics, it was one of the most debilitating diseases to which man was subjected. In the United States, the attack rate in veterinarians was as high as 400 per 100,000. The highest incidence of this disease in human beings was recorded in 1947, when almost 7,000 cases were reported in this country. Since then, there has been a consistent annual decrease of reported cases. In 1957, less than 1,000 human infections were reported.

A campaign to eradicate bovine brucellosis in the United States, which has been in operation for a number of years, has been accelerated, and, since 1953, considerable progress has been made. By early 1958, 11 states, including Minnesota and Wisconsin, had become modified certified areas. This means that cattle in these states have been tested for brucellosis and fewer than 1 per cent are reactors. In addition, almost 900 counties in other states are modified certified areas, and hundreds of townships have eliminated the disease from their herds. It is believed that about one-half of the states will have the infection under control by 1960, and the entire country will be relatively free of bovine brucellosis within a decade. Fortunately, there is no sheep or goat brucellosis problem in the United States. The goat reservoir of disease was eliminated a decade ago, and the infection has seldom been identified in sheep.

Swine brucellosis is a problem, however, especially in the Midwestern states, both to public health and animal health. A large per cent of the occupational type disease in man on the farm and in the packing house is of swine origin. Control programs are now getting under way in some of the hog-producing states. Swine brucellosis will not be as costly to eliminate as it was in cattle or will it be as time consuming because the swine industry is not so widespread. Also, it is more susceptible to eradication procedures because an infected swine drove can be sold for slaughter as soon as disease is identified, with little or no monetary loss except in the case of certain pure-bred herds.

This disease should be under control within the next ten years if the health and agriculture authorities give it the same support as they are giving the bovine brucellosis eradication program. Elimination of swine brucellosis will yield many economic and public health benefits. The control of the disease will remove an important cause of many illnesses among pigs. Of benefit to public health will be the fact that the major cause of occupational brucellosis would be erased.

In the control of brucellosis, the Scandinavian countries have set the pace. Denmark, Norway, Sweden, and Finland have all but eradicated the infection from their animals. Great Britain, Holland, Germany, Switzerland, and Austria are also making progress. In Spain, WHO is carrying out a sheep vaccination study to determine if this would be an effective control procedure. Many other countries are also supporting research on brucellosis control methods. No area having this

disease in its animal population can afford not to seek methods to eradicate it.

RABIES

Rabies is an example of an animal health problem which is rightly of much more concern to public health officials than it is to agriculture authorities. The very name has stricken the minds of men with terror for thousands of years. The communicability of the disease to man from biting dogs, wolves, foxes, and skunks has been known for centuries. Rabies is present throughout all the large continents of the world—North and South America, Europe, Africa, and Asia. Fortunately, it has never occurred in Australia, New Zealand, Oceania, or Hawaii. It has been eradicated in a number of areas, including western European countries and some West Indian islands.

Animal mortality due to rabies varies considerably throughout the world. In the United States, a ten-year summary reveals that all warm-blooded animals are susceptible. The dog is the animal most frequently affected, but, in recent years, canine rabies mortality has steadily declined, while that of the wild animals and farm animals has increased. The decline of rabies in dogs is attributed to the national rabies control campaign based on good local dog control and effective canine rabies vaccination. Canine rabies will no doubt eventually be brought under control in urban areas by these methods. This will eliminate or reduce the hazard of exposure to rabid animals for more than 80 per cent of the population except for those visiting rural or recreational areas.

Animal bites are second only to automobile accidents as a cause of nonfatal accidents in our country. A recent survey of animal bites revealed that dogs are by far the most frequent offenders. Furthermore, the survey showed that over a twenty-month period, 25 per cent of children under 10 years of age in the area surveyed were bitten. It is estimated that every year more than 2 million people are bitten by animals and that about 50 thousand of these require antirabies vaccination treatment. The value of vaccine therapy is demonstrated by the low-death rate from rabies in human beings. During the past decade, the death rate has fallen precipitously, and, in 1957, only 6 fatalities were reported in the United States.

Western Europe, including the Scandinavian countries, has set an effective example in the eradication of rabies. Norway and Sweden have been free of the disease since the late nineteenth century, as has Great Britain since the turn of

the century except for a short-lived introduction after World War I. During World War II, rabies was rampant on the Continent, but, within a few years after the reestablishment of civilian governments, France, Belgium, Holland, and Switzerland eliminated it. Denmark and Finland have also eradicated the disease except for occasional outbreaks in the areas bordering on East Germany and Russia. Farther east, Poland and Czechoslovakia have had success in reducing canine rabies incidence, but these countries also have wildlife reservoirs. Russia reports successful results from canine rabies immunizing control methods.

Unfortunately, there are many areas of the world where the dog is held in such low esteem that no efforts to control its numbers are practiced. Other reasons for lack of control programs include various cultural attitudes and lack of funds to obtain vehicles, train personnel, and establish dog impoundments where the animals can be put to death by euthanasia. WHO has assisted some countries in developing control programs. In Malaya, Israel, Southern Rhodesia, and Japan, all areas where rabies had become enzootic, control campaigns have been successful.

Such demonstrations have stimulated health authorities in other countries to re-examine their policies. There is no doubt of the effectiveness of good dog control and vaccination in reducing rabies in any region, and these measures can sometimes lead to virtual eradication of the condition if the wild animal reservoir is not extensive or important. The bat rabies situation, now under study in parts of North America as well as some areas of South America, has introduced a new potential in the maintenance of the virus. The bat disease has also been found in West Germany and Yugoslavia. The dog, however, is still the most important source of infection for man, and it behooves all health authorities to intensify their canine rabies control plans.

HYDATIDOSIS (ECHINOCOCCOSIS)

Hydatid disease is a major public health problem on nearly all the continents. The Mediterranean basin has the highest prevalence, followed by southern Latin America, Australia, and New Zealand. The hydatid or cyst form of the disease affects man, swine, dogs, cats, and rodents and herbivorous and wild animals. The tapeworm form is found only in dogs, wolves, and other members of the canidae family. The adult parasite has little effect on the dog. Man is susceptible only to the hydatid form of disease, which results from the ingestion of eggs passed by canine hosts.

The public health aspects of the disease far exceed the economic effects. The cysts in animals seldom interfere with their well-being. Most food animals are slaughtered before the developing cysts reach such a size as to cause trouble in the host. Ninety per cent of the cysts found in cattle and 20 per cent found in pigs are sterile. Sheep cysts are the most dangerous in the spread of disease to the subsequent host as less than 10 per cent of the cysts are sterile. In man the cysts have the opportunity to grow for many years and eventually interfere with the functions of the organs in which they are located. As they increase in size, they also develop daughter cysts which may disseminate the infection further. In some instances, the disease is so widely disseminated within the individual that he succumbs within months after the original exposure. On the other hand, some cysts develop so slowly that signs and symptoms do not appear until decades later.

In the United States, less than 1,000 cases have been reported since 1900. Most of the cases were in persons who had emigrated from Mediterranean countries. The disease occurs occasionally in domestic animals in the United States, such as swine, cattle, and sheep. The parasite has fortunately not been able to establish itself in the dog population, and, hence, there is little transmission of the disease to human beings in this country.

Control of the disease in man is based on elimination of the parasite in dogs. This is done through rigid dog control and repeated treatment of resident or work dogs. Probably just as important is preventing infection by prohibiting the feeding of infected tissues to dogs. Diseased, raw lungs and livers are often fed to dogs along with other offal when animals are slaughtered. If offal is to be used for dog food, it should be boiled. In areas where canine infection rates are high, dogs should not be allowed in households nor should they have any contact with children. Human beings may easily be infected by fondling and petting infected dogs.

The challenge of control is similar in many ways to dog control in connection with rabies. Effective dog reduction is difficult without full support of the public. An outstanding example of disease control was carried out in Iceland some years ago. In 1900, it had been estimated that between 35 and 50 per cent of the population was infected with hydatid cysts. At that time, something like 22,000 dogs were kept by the 70,000 people. This amounted to one dog to each three persons, compared to the United States' ratio of 1 dog to 8 persons. Following an

intensive dog control plan drastically reducing the number of dogs, the disease decreased in man and today it is quite rare in Iceland. Australia and New Zealand have also made progress in reducing hydatid disease through education, dog control, and prohibition of feeding raw offal to dogs. Argentina and Uruguay are making efforts to eliminate the infection. It is a problem that deserves more attention than it sometimes receives from sanitary officials and agencies in endemic areas. A national dog control program in those areas would be one of the most economical approaches to control. The gains from eradication of hydatid disease are such that no one can wisely pass the problem by, even temporarily.

RINDERPEST

Rinderpest or cattle plague occurs only in cattle. It is presented here as an example of an animal disease that does not have a direct effect on public health but indirectly may have serious consequences. It is an acute febrile disease of ruminants characterized by a rapid course and a high mortality rate. Diarrhea, ulcerations, and submucosal hemorrhages are common signs. It has plagued livestock for centuries, and, on occasions, it has destroyed the wealth of many families, tribes, and even nations.

The disease is enzootic in Asia and parts of Africa. It has spread from Asia to Europe on many occasions in the past, especially in time of war. The results of these epizootics have been devastating. During some invasions, a large portion of the cattle population of eastern Europe perished. One of the most dramatic panzootics of modern times was the introduction of the disease to South Africa in the 1890's where it swept through the ruminant population like a prairie fire. Millions of cattle and wild animals died during the period between 1889 when it first appeared and 1898 when it was checked. The plague is now enzootic in East Africa among game animals. Considerable progress has been made by the British Veterinary Service in eliminating rinderpest in some areas. It was announced recently that all of Tanganyika is apparently free of the infection.

The effect upon commerce and human welfare is well illustrated by the epizootics which were reported in China and southeast Asia during World War II. An epizootic in Laos from 1944 to 1945 destroyed 75 per cent of the cattle and buffalo. This epizootic also spread to the neighboring countries and caused similar devastation. The effect in these countries is measured not only by the loss of animal food products but also

TABLE 1
ANIMAL POPULATIONS^a
1954-1955

	<i>South America</i>	<i>North America</i>	<i>Europe</i>	<i>Asia</i>	<i>Africa</i>	<i>Australia</i>	<i>Oceania</i>
Cattle	147°	134	39	280	101	16	6
Swine	47	70	95	113	4	1.3	1
Fowl	45	485	552	250	87		1.2
Horses, mules, asses	26	15	20	36	14	.8	.2
Sheep	121	39	129	177	133	131	40
Goats	22	14	22	166	10		.2
Totals	408	757	857	1,022	349	149.1	48.6

^aIn terms of millions.

TABLE 2
HUMAN POPULATIONS^a

Asia	1,481,000,000
Africa	220,000,000
Australia	9,400,000
Europe	411,000,000
North America	238,000,000
South America	124,000,000

by the loss of animals used to work the fields and move rice from the farms to shipping points. The lack of transportation in these areas had far-reaching effects. There was a rice shortage in the urban areas which was quite acute. This resulted in poor human nutrition with subsequent public health problems.

Progress has been made in the control of rinderpest in the past decade. Much improved vaccines have been developed and are being widely used. The establishment of national veterinary services in areas where the disease is enzootic has contributed to its control. A campaign to eradicate rinderpest has been undertaken by many countries in Asia and Africa. The United Nations' Food and Agriculture Organization as well as the postwar UNRRA and the British Veterinary Service have effectively demon-

strated the value of control measures. The eventual control and eradication of rinderpest will contribute considerably in raising the standard of living of many people.

CONCLUSION

The animal population of the world (table 1) must keep pace with the human population (table 2) to improve the standard of living of man, including human nutrition, and public health. To insure a healthy animal population, improved veterinary medical services are needed in many parts of the world, with diagnostic services, educational centers, and facilities for research and training of ancillary personnel to carry out disease control operations. In addition, public health leaders must develop counterpart public health programs to prevent the spread of animal diseases which are frequently transmissible to man and, in some respects, more important as public health problems than they are as animal health problems. The problems that confront the greater medical field in comparative medicine, pathology, and epidemiology are further challenges to all concerned. The need for medicine to have close liaison with all its branches, especially veterinary medicine and public health, is paramount in advancing health of all men.

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Stress in the World, the Individual and the Doctor

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ONE OF THE distinguished features of social development in the past decades is the increasing recognition throughout the world that the security and welfare of one part of the world is dependent upon the security and welfare of each other part of the world.

Some of this recognition has been forced upon us by the technologic advances of the twentieth century which have created a shrinking world in terms of communication, transportation, and trade and the devastating effects of modern weapons of warfare. Mankind through the ages has been forced to develop social concepts to fit the realities of his changing environment.

The concept is shared by the great majority of the people of the world, regardless of their race, relations, nationalities, or professions, that this growing recognition of mutual dependence has not resulted from practical necessity alone. It also represents the ability of a maturing society to give fuller expression to a feeling that is as old as mankind itself — the desire to share with and to help one's neighbor.

This concept is present to more or less degree in all persons, but particularly in physicians. It is the primary motivation which causes a young man or woman to enter medicine and continues to be the guiding force throughout his professional life.

The people of the world have matured very slowly socially, but, at the same time, we have aged chronologically and physiologically much more rapidly. Two thousand years ago, the average person lived to be 25 years of age. By 1900, the life span was 49 years; by 1950, 67 years; and, in 1957, it reached the legendary three-score-and-ten.

As a result of this lengthening of the span, today in America more than 28,000,000 of our

fellow citizens are suffering from chronic disability. Staggering as this is, we can expect it to increase in the future; for, as our population continues to grow older, the incidence of chronic illness and its resultant physical disability will continue to increase correspondingly.

Contrary to the opinions expressed by some, this growing incidence of physical disability in our nation is a tribute rather than an indictment of American medicine. Advances in medicine have been one of the primary factors, along with improved nutrition, increased education, and better housing and all the contributing factors to our unprecedented current standard of living.

The skills of our physicians mean that thousands of Americans are alive today who would have died at the turn of the century with the same medical problems. Yet, many have not come out unscathed. They have survived only to find themselves confronted by residual physical disability. We, as physicians, have helped to create this problem; we, as physicians, bear primary responsibility for leadership in its solution.

These two parallel social phenomena of the past two decades — global interdependence and increased incidence of physical disability — have a mutual genesis in the tremendous scientific and technologic advances of this period. But there is a common denominator in both the corresponding but slower development of social maturity in which the democratic societies of the world place increasing value on human worth and the dignity of the individual.

During the past fifteen years, I have been professionally identified with rehabilitation — the third phase of medicine which takes the patient from the bed to the job and the branch of medicine primarily concerned with helping the disabled physically, emotionally, and socially to achieve the best life possible within the limits of their disabilities. The basic concept of rehabilitation is replacement of the passive concept of convalescence, in which time and nature take the place of the physician, with a concept of dynamic active rehabilitation built around the fulfillment of not only medical, but also emo-

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tional, social, and vocational needs of patients.

Our experience in this program of rehabilitation has changed the concepts which many of us have had about stress. In its usual connotation, stress implies strain. We frequently forget that stress also applies to the adaptation and stimulation that culminate in the fulfillment of the goals and ambitions of the patient which are expressed in his personality.

Man sets his goals to the stress point. If he does not use his full potentials, he vegetates; if he goes from stress to strain, he breaks. But, if he can either by himself or with proper guidance find the perfect blend or end point of his personal stress, his life is satisfactory and rewarding.

It has recently been shown in a careful study of 250 patients, with an average age of 63 who have had strokes of apoplexy, that the severity of the stroke had no correlation with the success of rehabilitation. If the patient had work to do, a home to which he could go, and someone to love and love him, regardless of the severity of the disability, the results were good. Certainly, this can be said of patients in surgical convalescence. The desire to live and not just to be alive is fundamental in the physical, emotional, and endocrinologic factors so important in immunologic and anabolic victories over degenerative processes.

There is a parallel between the personal experiences all of us have with stress, both as an enemy and a beneficent friend, as seen in our patients and the stress that marks our international relations. The problem we face in our desire to find a method of working toward world peace is to concentrate first on areas in which we of the democratic western nations and those of the communistic eastern nations can agree.

Those of us in medicine have long recognized that medicine knows no barriers of geography, nationalism, language, or religion. Through our international professional organizations and the World Medical Association and our support of the World Health Organization, we have given expression to this belief.

Today, there are exciting prospects that others are joining us in this belief. In his sixth State of the Union Message, President Eisenhower made a bold proposal of an international "Science for Peace" plan to attain "a good life for all." As a first step in such a program, the President invited the Soviet Union to join the current five-year program for the global eradication of malaria. This is a \$515,200,000, coordinated program being conducted by WHO and various individual nations. The United States is contributing \$108,400,000 of its cost over an eight-year pe-



DR. RUSK

riod. The President then stated our willingness to pool our efforts with the Russians in other campaigns against cancer and heart disease. "If people can get together on such projects," he asked, "is it not possible that we can then go on to a full-scale cooperative program of science for peace?"

Almost each successive week since, there has been some action toward the implementation of President Eisenhower's proposal. Senator Lister Hill of Alabama, long the dean of our American health legislators, almost immediately announced his intention to introduce specific legislation for a "Health for Peace" program. Our Department of State has announced plans for a limited exchange of scientific and medical personnel. Increasing numbers of Soviet and eastern European physicians are coming to our medical meetings. A new program of voluntary medical aid known as *Medico* has been announced to send teams of physicians and medically trained assistants into the underdeveloped areas of the world where they will build, equip, and staff medical clinics and hospitals. *Medico* is a real people-to-people concept carried out at the grass roots through a physician-to-patient program.

In the last few months, the attention of the world has been centered on satellites and missiles and the battle for the control of outer space. In this battle, international stress has passed the world's end-point and has become strain. But, today, through international medical cooperation, our stress can find an outlet in the far more important battle—the battle for the control of inner space—the inner space in the minds and hearts of mankind through the world. We in medicine have an unbelievable challenge and an unbelievable opportunity to provide leadership in this most important battle.

Rehabilitation of the Disabled

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IN RECENT YEARS, physicians and health workers throughout the world have become seriously concerned with the problem of rehabilitation of chronically ill persons. There has developed a world-wide, mass sociologic movement directed toward rehabilitation of these individuals. Here in the United States, the President's Commission on the Health Needs of the Nation has defined rehabilitation as "the restoration, through personal health services, of handicapped individuals to the fullest physical, mental, social, and economic usefulness of which they are capable including ordinary treatment and treatment in special rehabilitation centers." Our famous American elder statesman, Bernard M. Baruch, has said, "The investment in rehabilitation is an investment in the greatest and most valuable of our possessions, the conservation of human resources." The delegates to the World Health Organization, holding their annual meeting in Minneapolis, Minnesota, will undoubtedly be concerned with this new and important international philosophic approach to the solution of the rapidly developing problems of chronic illness.

Chronic illness is increasing enormously throughout the world, and international health workers should foster a movement to urge their medical associates in every land to abandon an attitude of passive acceptance and neglect of chronic illness and substitute an attitude of optimism and vigorous, dynamic physical, mental, social, and economic rehabilitation, thus achieving great benefits to chronically sick and disabled persons in all countries.

The world problem of rapidly increasing chronic illness is a major one, and it deserves as much, if not more, consideration as do the problems of acute illness. Until recently, physicians throughout the world have tended to devote



DR. KRUSEN

their major attentions to the causes, diagnosis, and cure of acute diseases. Efforts in this direction have been outstandingly successful. For example, in the United States, the life span of the average person has been extended from 49 years in 1900 to approximately 70 years today. Thus, in the United States, the life expectancy of people who have reached 65 years is still another 13.9 years. This indicates that problems of chronic illness will increase and will be of long duration. Because of the improvement in the management of acute illness, international health workers find now that they have produced for themselves a wholly new group of problems in relation to chronic illness. Our success in postponing death has led to the necessity for management of an ever increasing number of serious disabilities.

Chronically ill and seriously injured persons have been saved from death, but there can be worse things than death. It may be much more humane to provide services which will save disabled persons from years of dependency than to save their lives. The modern team approach to helping seriously handicapped persons attain the fullest possible self-sufficiency is now being developed at certain key centers in the United States in an extremely interesting fashion. In

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such key rehabilitation centers, trained medical specialists in physical medicine and rehabilitation work with specialists in many other fields of medicine; physical, occupational, and speech therapists; social workers; and vocational counselors to restore seriously handicapped persons to the fullest degree of self-respect and self-sufficiency.

In the state of Minnesota, there are at present three such complete rehabilitation centers — the Department of Physical Medicine and Rehabilitation at the University Hospital in Minneapolis, the combined Kenny Institute and Curative Workshop in Minneapolis, and the Section of Physical Medicine and Rehabilitation at the Mayo Clinic in Rochester. These centers strive to take the patient from his bed and return him

to the fullest possible activity of which he is capable. The variety of workers in such centers provide for physical and psychologic rehabilitation, prevocational evaluation, sheltered employment, and, finally, arrange for vocational training and placement of handicapped persons when necessary. Today international health workers can well consider the slogan that it is the physician's responsibility "not only to add years to life but also to add life to years," and they may well remember the definition given by that remarkable woman, Miss Mary E. Switzer, Director of the United States Office of Vocational Rehabilitation, who said, "Rehabilitation is a bridge spanning the gap between uselessness and usefulness, between hopelessness and hopefulness, between despair and happiness."

DURING THE LAST TEN YEARS, accidents have become a serious and often leading cause of death, particularly among children and adolescents. In North America and in parts of Europe, accidents account for nearly one-half of all deaths among boys between 5 and 9 years of age. Road accidents claim most young lives; then come falls, which in some countries are responsible for up to one-third of all accidental deaths; then drowning, fire, explosions, and poisoning.

Minnesota Shares in Professional Education for Better Health

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ELSEWHERE IN THIS ISSUE of the JOURNAL-LANCET, Dr. Grzegorzewski has described the important role played by WHO in promotion of professional education. The readers of this article may wonder what role the University of Minnesota is taking to share its technical knowledge and skills with other nations and to what extent the University benefits from this program.

It should be emphasized at the outset that WHO is not the only agency interested in the international promotion of professional training in the health sciences. To be sure, it is the largest and, because of the wide distribution of its membership, the most comprehensive in its coverage. Similarly, it is the most varied in its approach, for, as a multilateral agency, it is in a position to provide educational opportunities in any country where such training facilities exist. Thus, the students who are brought to the United States represent only a fraction of the total who may be assigned for study in other countries. Wherever training facilities exist there may be found an international student body assembled under WHO auspices.

Mingled with the WHO trainees brought to the United States, however, we will find students whose period of study is provided by the International Cooperation Agency as a part of its bilateral program for help to other nations. Other students are supported by their respective governments or by one of the foundations, such as the Kellogg Foundation, the Bureau for Medical Aid to China, the American-Korean Foundation, or the Near-East Foundation. The entire list of agencies which have included support of professional education as part of their programs is too long to be recorded here. However, special note should be made of the Rockefeller Foundation which directed its attention to this program early in the century and essentially pio-

neered its development long before the creation of WHO or ICA. Many of the WHO delegates attending this assembly are persons whose early professional training in public health was made possible by this Foundation through its former International Health Division.

As one of the educational institutions to which WHO and other agencies send students for advanced professional education, the University of Minnesota has an opportunity to share its facilities with other nations. Each year physicians, nurses, and other health personnel come to Minnesota from all corners of the globe to carry on advanced studies in their respective fields. Every school of the College of Medical Sciences, every department of the Medical School, and every component of the Mayo Foundation have participated in this program to varying degrees. Graduates and former students are scattered throughout the world, many occupying positions of major responsibility in their respective countries, many engaged in teaching, and others in governmental posts.

Since WHO is essentially a health organization and, as such, has given special attention to training of personnel to occupy responsible positions in their respective health ministries, a look at the foreign students in the School of Public Health may serve as a good example of what one part of the University contributes to the international health program. Since the end of World War II, 278 students from nations other than the United States have been enrolled in the school for graduate training. All have had basic professional training in their respective countries, occupied positions of varying degrees of responsibility in their homelands, and have come to this country to learn more about public health that can be applied to the solution of their own problems. Included in this group have been 72 physicians, 57 public health nurses, 56 engineers, 29 health educators, 24 statisticians, 19 hospital administrators, 15 veterinarians, and 1 dentist and 5 in other health fields. Of them, 50 have been supported by WHO and 137 by ICA or its predecessors.

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Students have been enrolled from 54 nations or areas in all — Afghanistan, Argentina, Bolivia, Brazil, Canada, Ceylon, Chile, China, Colombia, Costa Rica, Cuba, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, England, Finland, Formosa, Germany, Greece, Guatemala, Haiti, Honduras, India, Indonesia, Iran, Iraq, Israel, Italy, Jamaica, Japan, Jordan, Korea, Lebanon, Liberia, Mexico, Nevis, New Zealand, Nicaragua, Norway, Pakistan, Panama, Peru, Philippine Republic, Sweden, Switzerland, Tanganyika, Thailand, The Netherlands, Turkey, Uruguay, Venezuela, and Yugoslavia.

The various other components of the College of Medical Sciences could similarly point to their records of foreign students, as could also each of the other 10 schools of public health in the United States. In the School of Public Health at Minnesota, we are proud of the part that we have been permitted to play in this educational program, and we recognize with due humility that we are but one part of the University that is performing this function and that Minnesota is but one of many universities that is making its facilities available for world-wide education in the health sciences.

All of the program is not, however, carried on within the academic halls of the University or the hospitals and health agencies that serve the community. Education is a two-way street. Staff members of the School of Public Health and other parts of the College of Medical Sciences have participated actively in teaching missions in other countries or have served in consultant capacity to WHO or ICA in various phases of their educational programs. Others have benefited from opportunities to study or observe health programs in other countries, thus enriching their knowledge of the problems and conditions to which their students will return upon completion of their studies in this country.

No sketch of the University's contribution to international education in the health field would be complete without mention of the special program of assistance to the National University of Seoul in Korea. In 1954, the University signed a contract with ICA to assume special responsibility to aid the National University of Seoul in



DR. ANDERSON

re-establishing and strengthening its programs in medicine, agriculture, and engineering. This program, financed by ICA but conducted under University auspices, has provided for the sending of staff to Korea to serve as faculty advisers and, more important, for the bringing of Seoul faculty to Minnesota for varying periods of graduate study and observations of methods of professional education. Since the inception of the program, 36 members of the Faculty of Medicine of Seoul have spent periods of study at the University ranging from six months to three years. Simultaneously several members of the University staff have spent varying periods at Seoul, and the University has handled a program of purchase of equipment to replace much of what was lost or destroyed in the period of hostilities.

Again, it must be emphasized that Minnesota is not unique in its contribution to international education in the health sciences. Neither health nor knowledge recognizes political boundaries. Universities everywhere share in this privilege of participating in a global program of exchange of human knowledge. Just as we in Minnesota share our knowledge with others so others share their learning with us as do universities, hospitals, and medical installations throughout the world, each making its contribution toward better international understanding and better health.

Non-Venereal Syphilis: a Sociological and Medical Study of Bejel, by ELLIS HERNEON HUDSON, M.D., 1957. Baltimore: Williams and Wilkins Co., 212 pages, 91 figures. \$7.00.

This monograph is based upon an earlier phase of the author's life when, for nearly seventeen years, he was a resident of Lebanon and Mesopotamia. He and his wife set up their home on the Euphrates River thirty-four years ago, and his first paper on bejel, the non-venereal syphilis of the Bedouins, appeared in 1928.

The present book grew out of the many papers written by the author on this subject in the intervening years and from a statistical study of the bejel cases which he made under the auspices of the research section of the United States Public Health Service in 1955.

The subtitle indicates that the book is of sociologic as well as medical interest. He describes the differing impact of syphilis upon three different social groups all living in the same isolated area. He shows that under primitive conditions, syphilis is a non-venereal infection among the children but gradually becomes venereal in adults as community hygiene improves. There is an interesting chapter in which this ecologic approach is applied to the question of the origin of syphilis.

The author boldly attacks the controversial question of the relationship between syphilis and yaws and brings forward the present evidence that they are both caused by the same parasite, *Treponema pallidum*, and advocates the inclusive name "treponematoses" for both. He uses bejel as an illustration of endemic syphilis which bridges the gap between venereal syphilis and yaws, and he indicates that endemic syphilis is intermediate in respect to historic evolution, epidemiology, clinical appearance, serology, pathology, and experimental biology. The treatment of the three forms of treponematoses is identical.

The underlying philosophy of this book is in line with today's disease concepts. It deals with a geographic area that is in this morning's headlines; among other things, it touches on tropical medicine, venereal disease control, anthropology, the geography of disease, and suggests a revision in conventional thinking about social hygiene.

It seems that bejel can hardly be dismissed as a local and exotic disease of slight importance to the



American reader. This is a unique story of a personal experience, and it deals with important matters. Above all, it is interesting reading.
J. ARTHUR MYERS, M.D.

•
Ankylosing Spondylitis, by J. FORESTIER, M.D., F. JACQUELINE, M.D., and J. ROTES-QUEROL, 1956. Springfield, Illinois: Charles C Thomas. \$10.75.

The English edition of this volume has been translated from the original French edition that was published in 1951. It is directed toward the presentation of a type of rheumatic syndrome that is considered by these French authors to be a true, clinical entity separated entirely from rheumatic heart disease and rheumatoid arthritis. Such opinion does not receive acceptance by most English and American students of this disease who, in turn, feel that it represents a variant of rheumatoid arthritis. However, the basis on which these investigators have formed their distinctive evaluation appears to have a devoted tendency to isolate this rheumatic-like complex into a separate clinical entity. The study is based on a series of some 200 patients with ankylosing spondylitis with various symptomatology and, at times, rather bizarre complaints. Actually, in reading the volume, it seems that any type or obscure form of arthralgia could develop into a full-blown case of ankylosing spondylitis. This had been the source of controversy with the American rheumatologists who have seen similar prodromal symptoms turn into acute rheumatic heart disease or, later, become manifest as chronic, disabling rheumatoid arthritis with pronounced peripheral involvement. The book does have considerable merit in that it presents views which are apparently based on expert clinical judgment. Readers will find a satisfactory historic background for the many synonyms and rather unusual designations from the clinical standpoint that this entity has received.

The subject is well-covered with a complete evaluation of the disease based on spinal, extra-articular, and peripheral symptomatology in its insidious onset. The pathologic anatomy is well-defined and is further aided by photographs of dry specimens and radiographic reprints. Photomicrographs are also used to an advantage, and a review of treatment is included.

The format of the book is good, allowing those interested in the subject to review the entire concept of the disease from its origin to the present-day methods of therapy. The iritis and ocular manifestations that may occur have been presented so that the clinician becomes aware of this manifestation as an obscure symptom of the onset of the disease.

It is obvious, however, that a precise description of the ankylosing spondylitis has not been established and that we must endeavor through clinical observation and basic research to separate, if possible, these various entities. The book is highly recommended to those who are interested specifically in this condition. It is also worthwhile to others in ancillary specialties, such as orthopedic surgery, rehabilitation, and diseases of childhood. General physicians, rheumatologists, and internists will enjoy its content.

HARVEY O'PHELAN, M.D.

•
Diseases of the External Ear, by BEN H. SENTURIA, M.D., written with the assistance of CARL F. GESSERT, Ph.D., MORRIS D. MARCUS, M.D., BERNARD C. EDLER, M.D., FRITZ M. LIEDMANN, M.D., LAWRENCE H. SOPHAN, M.D., CHARLES D. CARR, M.T., and ELIZABETH S. BAUMANN, A.B., 1957. Springfield, Illinois: Charles C Thomas, 214 pages. \$8.50.

This volume fills a real need in otolaryngological literature. No one has appreciated this void more than the author. While Dr. Senturia was serving in the armed forces in 1942, he recognized the great confusion in diagnosis and the conflicts in methods of treatment of the severe fungus infection of the external ears seen so frequently in the exposed troops. This was especially true of the cases seen in the southern United States and in the South Pacific.

Dr. Senturia's interest was stimulated to such an extent that, for the past fifteen years, he has made a detailed study of this problem. This book is a comprehensive report of his extensive experiments and tests

(Continued on page 40A)



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BOOK REVIEWS

(Continued from page 286)

conducted under the auspices of the Army Medical Department. He made subsequent studies as a practicing otolaryngologist and teacher in the department of otolaryngology at Washington University, St. Louis.

In many respects, some of the chapters in this work may be too detailed for the average reader to enjoy or find useful. The sections on Animal Experiments, Chemistry and Prophylaxis of External Otitis are in this category. However, for the serious student and investigator, these chapters will be very rewarding.

The comprehensive extent of this volume may be shown by listing the chapter headings: 1. Introduction, 2. Factors considered responsible for External Otitis, 3. Anatomy and Histology, 4. Classification of Diseases involving the External Ear, 5. Microbiology, 6. Pathology of External Otitis, 7. Animal Experiments, 8. Chemistry, 9. Pathogenesis of Diffuse External Otitis and Otonycoosis, 10. Prophylaxis of External Otitis, and 11. Treatment. As an aid to further study, an exhaustive reference list and bibliography supplements each chapter.

External otitis, involving either

the auricle or external auditory canal, has never been a satisfactory or easy condition to treat. For many years, external otitis was thought to be caused by various fungus organisms. Now, largely due to Dr. Senturia's studies, it is known that various gram-negative bacilli are the chief offenders. As a result of these studies, methods of treatment have been clarified and made much more effective.

In the author's characteristic fashion, the chapter on Treatment is comprehensive and complete. For each condition, specific directions and prescriptions are given. Fortunately, vague generalities are avoided. It is refreshing to see that the author makes sure the new drugs specified are listed according to the proper pharmaceutical manufacturer. It is interesting to note that old tried and tested drugs (Burow's solution and Cresatin) are still used, supplemented by the new antibiotic and cortisone mixtures.

All in all, this is a most interesting and factual work. I believe it is unique in that it is possibly the first all inclusive work concerning diseases of the external ear. I personally feel grateful to Dr. Senturia and his associates for this fine book.

Physicians, medical students, residents in otolaryngology, and otolaryngologists, who desire a convenient reference to current data of diseases of the external ear should find this book very rewarding.

GEORGE M. TANGEN, M.D.

•
Brain Mechanisms and Drug Action, edited by WILLIAM S. FIELDS, M.D., 1957. Springfield, Illinois: Charles C Thomas, 147 pages. \$4.25.

The provocative and encompassing title suggests a multidisciplinary approach dealing with the basic mechanisms concerned with activity of neurotropic drugs. Several disciplines are covered, including those of nervous system electrophysiology, neuroendocrinology, and psychology. The broader aspects of neuropharmacology are only lightly touched upon, and the large body of neurochemical information on drug activity is notably absent. The drugs are also limited with the principal attention devoted to the tranquilizing agents chlorpromazine and reserpine.

This publication represents one of a series of symposia sponsored by the Houston Neurologic Society.

(Continued on page 43A)



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BOOK REVIEWS

(Continued from page 40A)

The book is organized in separate papers dealing with the experimental results of a number of investigators, utilizing principally the tranquilizing drugs. The opening paper is a succinct and simplified review of the reticular activating system by R. Livingstone. This is the only anatomicophysiology system so selected. The reason for the selection of this system and deletion of others concerned with drug action is not apparent. The next paper is an electroencephalographic study of the effects of tranquilizers on the reticular system of Himwich and Rinaldi. Morrazi's succeeding contribution utilizes evoked potentials in the study of the same drugs. E. K. and F. F. Killen report on the use of these agents employing paired shock stimuli, evoked potentials, and electroencephalographic arousal thresholds. The pituitary adrenal response following toxic systemic stress (dilute formalin subcutaneously) and emotional stress (forced restraint) is covered by R. Guillemin. The final paper by J. V. Brady deals with the effect of tranquilizers on conditioned behavior. D. Mck. Rioch aptly summarized the conference.

In general, the papers were thoughtfully and clearly presented. They provide additional information on small foci of the problem of brain mechanisms of drug action but leave vast portions of the field untouched.

MAYNARD M. COHEN, M.D.

•
The Medical Interview, by AINSLIE MEARES, M.B., B.S., B.Ag., 1957. Springfield, Illinois: Charles C Thomas. \$2.50.

This is a big-little book — big in the sense that it offers valuable help in the art of medicine and little in that it comprises only 112 pages.

Psychiatrist Meares brings to our attention a long neglected art in the practice of medicine. It is simply the establishment of a friendly rapport between the physician and the patient which results in faith and confidence in the physician.

With the many technical advances in the field of medicine, less and less attention has been centered on this important relationship. The busy doctor, surrounded by a mountain of laboratory tests, finds little time to visit with the sick patient.

Dr. Meares presents the interview as an informal friendly exchange of

ideas between doctor and patient, which relieves the emotional tension.

There are various steps involved in the interview. Each step tends to establish a closer understanding and a better acceptance of the medical examinations that are to follow.

The gentle and friendly exchange of each other's interests leaves the patient with a feeling of receptiveness to further medical procedures and a confidence in the doctor.

In our contacts with patients, we are frequently confronted by the pause of silence which, unless understood, can lead to bad rapport. Dr. Meares has this to say, "Silence in the interview is much more than the mere cessation of speech. It has meaning. It has a cause and it produces effects both on the patient and on the physician. Silence is emotionally charged. On account of this, it can be used to the great benefit of the patient, but its inept use can do great harm." We are reminded of the old saying, "The best substitute for wisdom is silence."

All physicians should read this book and benefit from it. The practice of its principles may not make more money for the doctor, but he will acquire more contented patients.

ARNOLD S. ANDERSON, M.D.

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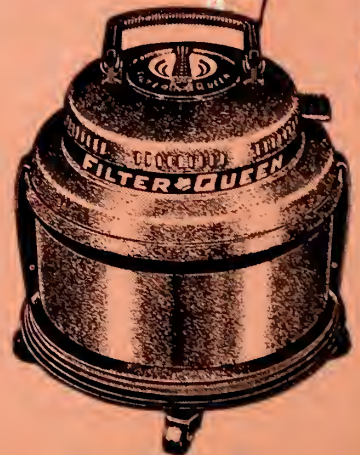
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The Tolbutamide Dilemma

E. A. HAUNZ, M.D.

Grand Forks, North Dakota

IT HAS BEEN POINTED OUT that "the search for oral antidiabetic agents is as old as our knowledge of diabetes mellitus,"¹ although the first major breakthrough did not occur until 1955, when carbutamide was made commercially available in Europe. Fortunately, in this country, the use of carbutamide never passed the clinical research stage, being superseded by the development of tolbutamide, which is decidedly less toxic but possessed of slightly less hypoglycemic potential than carbutamide. The obvious efficacy of tolbutamide in lowering blood glucose levels, coupled with an apparent but not totally proved innocuousness, has resulted in unprecedented oral medication of nearly a quarter of a million diabetic patients who have now abandoned insulin.

While tolbutamide is not actually an insulin substitute, its use is rapidly expanding despite lack of conclusive evidence that it accelerates peripheral glucose utilization and that it is, in reality, devoid of long-term toxic effects, cumulative or otherwise. Apart from its obvious hypoglycemic effect, virtually, the sole fact conclusively established is that tolbutamide and related sulfonylurea compounds are ineffective in the total absence of islet-cell function, in ketoacidosis, and in the control of juvenile diabetes.

E. A. HAUNZ is associate professor of clinical medicine at the University of North Dakota School of Medicine, on the staff of the Grand Forks Clinic, and past chairman of the Board of Governors of the American Diabetes Association, Inc.

Criteria devised for the selection of likely candidates for tolbutamide therapy have not been uniformly successful, because a significant number of patients prove to be "exceptions to the rule." Contrariwise, criteria for the prediction of likely therapeutic failures are more easily formulated and more reliable. As Levine succinctly puts it, "One thing that seems clear, however, is what the sulfonylureas do not do."² With strict adherence to and close scrutiny of such criteria, patients may be spared a great deal of grief and unnecessary expense. Under the pressure of drug salesmen, the compelling forces of the lay press, and, finally, the patient's own demands, it is not unexpected that physicians' usual conservative barriers weaken and, perhaps, too often yield to these influences.

If it were not for the fact that tolbutamide is competing with an agent seasoned with a generation of therapeutic triumph and apparent freedom from immediate or long-term toxic effects, there would be much less justifiable criticism of what appears to be unwarranted enthusiasm to simply replace a daily injection with a pill. In the July 8, 1957, issue of *Life* magazine, Senator Clinton P. Anderson, himself a diabetic for well over twenty years, criticized the "tone" of a preceding *Life* article, titled "The Diabetic's Life-giving Ordeal," in which Mr. Lec grimaces with pain as he injects his insulin in the absence of his wife, who "cannot bear to watch." The senator states, "Tell the diabetics not to give themselves too much sympathy for doing a mi-

minute segment of the daily task of getting spruced up in the morning."

Conceding that a high percentage of diabetic patients exhibit an impressive response to tolbutamide, the wisdom of substituting this drug for insulin simply for convenience may be logically challenged in view of our currently meager factual knowledge. On the other hand, successful transition from insulin to tolbutamide is unquestionably a most rewarding experience in cases of poor vision, parkinsonism, hemiplegia, senility, and other incapacitating disorders which render self-administration of insulin difficult or impossible. It is for these patients that tolbutamide may be heralded as a most notable event in therapeutics. On the other hand, why not ask ourselves a pertinent question: Are we really justified in rapidly converting such vast numbers of diabetic patients, previously well controlled on insulin, to a drug whose long-term effects are enigmatic and whose precise pharmacodynamics are so poorly understood? To fortify this question, we must realize that this appears to be only the beginning of a new era in therapeutics, for newer oral antidiabetic compounds are already under study, such as DBI and chlorpropamide, which may be capable of accelerating peripheral utilization of glucose.

It has been suggested that the "double blind" method be utilized in future clinical studies of milder diabetic patients who are converted from relatively small doses of insulin to tolbutamide therapy. Such an approach would expose many cases in patients who, whether overweight or not, appear to be better controlled simply because of stricter adherence to dietary measures. Furthermore, a number of such patients could thus be exposed who would require neither insulin nor tolbutamide to control their diabetes. This is an obvious example of improper use of either drug.

The practitioner must be keenly alerted to the fact that stress situations, such as infection, surgery, trauma, shock, and pregnancy, not uncommonly exacerbate the diabetic state and that the risk of ketoacidosis and/or coma in such patients is very pronounced. The need to resume insulin may be emergent. The physician must create awareness of this fact in the patient.

The concept of dosage of tolbutamide is now quite clearly established. The effective dose is usually 1 gm. daily and not more than 2 gm. per day. Administration of 3 to 5 gm. or more per day not only fails to exert any further hypoglycemic effect but, in some cases, increases hyperglycemia and glycosuria for unknown reasons. Insulin should never be withdrawn abruptly.

The statement that tolbutamide is overtly less

toxic than carbutamide should not imply that we can ignore these effects from the former drug. Dermatitis, nausea, gastric irritability, headache, and leukopenia still occur in approximately 3 per cent of cases. Liver function is sometimes temporarily disturbed, as reflected in transient abnormal bromsulphalein tests and alkaline phosphatase determinations. Except for allergic phenomena, insulin has appeared to be singularly innocuous for thirty-five years. Will tolbutamide or related compounds meet this challenge? It is not known as yet whether the supposed betacytotropic effect of tolbutamide may in time eventuate in beta-cell exhaustion.

A curious phenomenon which merits further study is the apparent difficulty occasionally encountered in attempting to re-establish insulin therapy after tolbutamide failures. Sheridan³ has encountered 2 and the writer 3 patients exhibiting this phenomenon. One of the latter patients, a 47-year-old male, lapsed back into profound ketoacidosis after two weeks of extreme difficulty in re-establishing control on insulin. This patient, previously quite stable for several years on insulin, became very unstable or "brittle" for a period of several weeks thereafter. During his bouts of ketoacidosis, extreme tachycardia was noted without shock. He died of an acute coronary occlusion three months later. Autopsy confirmed the diagnosis, and there was no evidence of myocarditis, such as is seen from carbutamide therapy.

An unbiased appraisal of tolbutamide should include the statement that a significant number of so-called "stable" diabetic patients exhibit even smoother control of the blood sugar on tolbutamide than on insulin therapy. However, this should be weighed against the observation that, if the patients are restricted to those who must have oral drug therapy and respond well to tolbutamide, approximately one-third will eventually have to resume insulin. The latter group are termed "secondary failures," and a few of these patients exhibit somewhat higher insulin requirements than previously.

The economies of tolbutamide versus insulin administration merit some comment. Since the oral medication is customarily indicated only in adults with maturity-onset diabetes who require less than 40 units of insulin daily, the cost of insulin for such patients never exceeds \$4.38 per month and is on the average considerably lower. Receiving tolbutamide, the current rate of which is approximately \$15.00 per 100 tablets ($\frac{1}{2}$ gm. each), the patient usually requires a minimum of 1 to 3 tablets a day, costing from \$4.50 to \$13.95 a month. In my experience, a number of

patients have taken only 20 units of insulin daily, and they are quite disturbed to find that, if they require 2 tolbutamide tablets daily for adequate control, their monthly cost for medication jumps from about \$2.20 to \$9.00 a month. Relatively few patients are satisfactorily controlled on 1 tablet a day.

Finally, it seems only fair that the patient should have a voice in the decision to change from insulin to tolbutamide. I have been amazed at the percentage of my patients who prefer to "stick with insulin" when they are presented with an honest forthright picture of our present knowledge of the action of tolbutamide in lay language. Even patients who come in requesting a trial of "the pills" not infrequently reverse their decisions. Among 72 patients who either requested or were offered a trial of tolbutamide, 52 (72.2 per cent) either withdrew their request or refused the drug. No attempt was made to "pressure" the patient in either direction, the approach being very similar to that advised by Duncan⁴ who states, "The patient is made aware that we are traveling an uncharted course and must be more alert than ever until the potentials, good or bad, of these drugs, as they affect the great variety of patients under a great variety of circumstances, are familiar to us."

In an effort to establish a broader base for the views expressed here, the accompanying brief questionnaire was sent to eminent clinicians and investigators in Boston, New York, Philadelphia, Cleveland, Detroit, Chicago, St. Louis, Denver, San Francisco, and Seattle. The opposing answers to question number 5, evenly divided, are enough in themselves to justify the word "dilemma" in the title of this article. This is admittedly a small sampling of clinicians' opinions, but the latter are bona fide specialists in diabetes and as a group are seeing several thousand diabetic patients. A separate inquiry revealed that the number of patients who had been converted from insulin to tolbutamide therapy among the physicians queried ranged from 1 to 20 per cent.

It is perhaps disheartening but not unexpected that physicians eminently qualified in the specialty of diabetes do not share identical opinions with regard to the questions asked. This simply strengthens the view that incontrovertible evidence for a clear-cut position for tolbutamide in our therapeutic armamentarium is sorely lacking at present. Much of the current literature is based on rather tenuous hypothetical concepts.

The wheels of medical progress must ever continue in a forward direction, but their velocity ought to be tempered by the soundness and safety of investigative inroads which should lead

QUESTIONNAIRE

1. Do you feel that tolbutamide is being used too extensively and too indiscriminately by general physicians in your area?

Yes	6
No	3
Don't know	1

2. Have you encountered diabetic patients previously satisfactorily controlled on insulin who developed ketoacidosis on tolbutamide and had to be re-established on insulin?

Yes	8
No	2

3. Have you seen any actual deaths from diabetic coma developing after tolbutamide therapy?

No	10
----	----

4. Do you think practitioners in general often fail to heed established criteria for selection of diabetics for trial with tolbutamide?

Yes	7
No	2
Don't know	1

5. Do you believe tolbutamide is now an established and acceptable treatment in properly selected diabetics?

Yes	5
No	5

6. Have you sometimes found it very difficult to re-establish insulin treatment in so-called tolbutamide failures?

Yes	2
No	8

to a common destination — a safe haven in which the patient not only escapes the ravages of disease but likewise the penalties of therapeutic zealots who often try too much too soon.

In conclusion, the preceding commentary is by no means designed to nurture a nihilistic approach to the use of tolbutamide, for many of us recall the early skepticism which accompanied the advent of insulin. Rather, it is hoped that these remarks represent a modest attempt to season unwarranted enthusiasm with enough conservatism to safeguard the well-being of the diabetic patient.

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The Modern Treatment of Compound Fractures

GEORGE W. HORTON, M.D.

Odessa, Texas

“A COMPOUND FRACTURE,” states Dr. Edward L. Compere,¹ “constitutes one of the most serious of all emergencies; the involved bone is exposed through the skin and must be considered to be potentially infected. The need for prompt and adequate surgical care is as urgent as that for the treatment of acute appendicitis, a ruptured spleen or the perforation of a peptic ulcer.” Believing this to be true, and having found very little about this subject in the literature since the period following World War II, this paper is presented in the hope that interest in this very serious problem will be stimulated and that even greater improvements will be brought about.

The most important aim is the attempt to prevent infection. With a clean, healthy wound, orthopedic surgery can give satisfactory results, but the presence of infection presents an unusually difficult situation.

INITIAL TREATMENT

The wound should receive attention immediately, at least to the extent of being covered by a sterile dressing in the emergency room. As soon as the condition permits, the patient should be carried to the operating room and a general anesthetic should be administered to allow for the necessary exploration of the wound and also to allow fixation of the fracture. Parasympathetic blocks should sometimes be used to relieve vasospasm before deciding to operate. Even the smallest puncture wound should be excised.

The radical excision of dead and devitalized tissues as an immediate procedure gained some favor toward the close of World War I but really came into importance during World War II. Authors such as Stinson,² Davis,³ Hampton,⁴ Peltier,⁵ Eaton,⁶ and others, including Key and Conwell,⁷ have stressed the importance of attention to the wound.

GEORGE W. HORTON is an orthopedist with offices in Odessa, Texas.

Paper read before American Fracture Association annual meeting in El Paso, Texas, October 1957.

OPERATIVE TECHNIC

The skin is shaved as close as possible to the wound edge in such a manner that no hair is allowed to drop into the wound to cause further contamination. It is most important that the surgeon himself prepare the wound for surgery unless he is fortunate enough to have a well-trained team of assistants. The doctor, after scrubbing and putting on sterile gloves, covers the inside of the wound with sterile gauze. Holding the gauze in place with one hand, he then thoroughly scrubs the skin over an adequate area with pHisoHex or one of its equivalents. Care should be taken that no drops of water and soap carry dirt from the outside of the patient's skin down into the wound. The sterile gauze from the wound is then removed, and the wound edges are more completely scrubbed, still taking care not to contaminate the wound with any of the solution of soapy water.

In more than 35 patients, I have had 1 failure and 2 serious infections. The failure resulted when another surgeon convinced me that we should try washing the wound out with pHisoHex without protecting it with a sterile gauze; in the other 2 cases, others had prepared the wound. Many of these have been severe soft-tissue wounds.

After the wound has been cleaned, the skin edges are draped and excised. Any questionable appearing skin should be excised also. Davis³ stated that, in his opinion, failure was more often due to attempts to save questionable skin than to any other factor. Particles of clothing or pieces of gravel, metal, and so on, which may cause gross contamination, should be removed with forceps, if possible, and the wound should then be thoroughly irrigated from the depths upward with large amounts of sterile solution, such as physiologic saline. At this time, it is advisable to change gloves and instruments and to use fresh drapes about the wound. Any portions of devitalized muscle should be completely excised because infection is most likely to occur in a wound containing dead or devitalized tissue.

Before closure, if a tourniquet is used, it should be removed and any tissue which does not bleed adequately or show the proper color should be excised to insure adequate removal of this tissue. Important vessels, nerves, tendons, and so on should be protected as much as possible.

The bone should then receive attention. Very small pieces which are lying loose should be removed and discarded. Large pieces which are attached and not too grossly contaminated should be thoroughly cleaned with a rongeur or curet and irrigated with saline. Cultures should be taken for sensitivity studies. At this stage, any fixation which is to be carried out should be done, and a decision should be made as to whether to close the wound as a primary procedure or to pack it open loosely. If there is not an excess of gross contamination and if the wound is being treated within the first six to eight hours, I believe that the wound should be closed. In closing, no overhanging tissues should be left. The muscles should be approximated very loosely with running sutures of plain catgut. Torn nerves and vessels should be sutured if feasible. By all means, the bone should be covered with as much healthy tissue as possible, just as in a compound wound of a joint, the synovium is closed, even though the remainder of the wound is packed open. Lack of covering tissue probably explains why more tibias become infected.

The skin should be closed without tension. In some cases, the skin will have become so questionable or so much swelling will have occurred that this cannot be done without the aid of relaxing incisions, which can be made at some distance on each side of the wound or with the use of a sliding flap. In some cases, of course, full thickness skin grafts need to be applied.

If the condition of the patient is such that immediate attention cannot be given to the wound, it should be treated as soon as possible. Stimson,² in reporting on the handling of compound fracture wounds in the Italian campaign, stated that they had obtained excellent success by closing wounds after several days in transit.

For wounds in which it is felt inadvisable to do a primary closure or in which there is inadequate skin, preparation for a secondary closure can be made. This consists of packing the wound rather loosely with fine mesh gauze, which drains more freely than a tight packing of vaseline gauze. The findings of World War II have amply established the procedure of secondary closure, which can be carried out from five to ten days later.

In spite of all of the literature on war experiences, many medical men are still reluctant to close the wound of a compound fracture. Davis³ presented a very good argument for a primary closure by reporting his series of 150 cases in which 87 per cent of the wounds healed by first intention. Fifty-six of these cases were tibias, which, in most instances, were protruding and soiled, and the majority of cases healed as would a simple fracture. Against this, he pointed out some of the penalties of the open treatment with sequestration and so forth and a much longer convalescence.

One other important point is that strict asepsis should be carried out, just as though no antibiotics or antisera of any sort were available. No matter how helpful antibiotics are, they should not be completely relied upon. Peltier⁵ stated this very clearly when he said, "Antibiotics and antisera cannot overcome deficiencies of inadequate surgical techniques, although they are of great value in preventing or localizing infection."

Eveleth⁶ reported on the use of sulfonamides in compound fractures in the days before penicillin. He found that 19.3 per cent of cases became infected without and 19 per cent with the drug and came to the conclusion that it had no particular value in the treatment of the compound wound.

Peltier⁵ summed this up succinctly when he stated that one should not rely on "a broadside of fungal derivatives, but on an adequate surgical excision of the wound."

If infection does occur, cultures should be obtained from aspiration or wide opening of the wound and sensitivity studies used so that proper antibiotics can be administered. It is known, of course, that these sensitivity studies are not 100 per cent correct in all cases, but they offer a very good guide. Probably the two most useful antibiotics are penicillin and streptomycin in combination as a prophylactic used immediately following surgery until the wound is healed or until culture can be obtained to show the need for some other antibiotic.

INTERNAL FIXATION

We come now to the question of fixation of the fractured bone. In the Spanish Civil War, Trueta felt that immobilization and infrequent dressing were extremely important in the prevention of infection.

While it is felt now that a primary suture is an improvement over the Trueta-Orr method, the principle of immobilization as a means of preventing infection is still very important.



Fig. 1. *Case 2.* Note extensive scarring caused by the accidental compound wounds.



Fig. 2. *Case 3.* Trochanteric and subtrochanteric fracture. Note extent of compound wound of soft tissue.



Fig. 3. *Case 3.* Note extent of deep infection as shown by opaque media (Diodrast) injected into sinus.



Fig. 4. *Case 3.* Photograph of x-ray not very clear but bone well healed, even in saucerized area. Wounds have been healed for four and one-half years.



Fig. 5. *Case 6.* Note extensive soft tissue damage and severe comminution of tibia.



Fig. 6. *Case 6.* Fracture healing, fixation by pins incorporated in cast.

Therefore, it is felt that just as immobilization of a fracture decreases shock it also favors the healing of the wound without infection.

There are still discussions going on as to whether or not internal fixation should be carried out in the presence of a compound wound. Davis³ and Peltier⁵ both advise metallic fixation when indicated for the bone, even in the presence of a compound wound. Key and Conwell⁷ state, "While it is true that in some cases of internal fixation mild infection will appear and will have to be treated, and the internal fixation removed, there is no reason to not use metallic devices."

There are very good arguments for the use of a primary closure as opposed to open treatment and watchful waiting. So many cases of internal fixation have now been used in which the fracture was converted to a simple fracture, convalescent time and disability were saved, and the need of future operations eliminated that closure and fixation are advisable. More than 90 per cent healed by first intention and progressed as a simple fracture. The cases given are only the poor ones. We would use different methods in some, but hindsight is better than foresight.

As can be seen in a few of the cases presented here, the infection was so mild that the bone could be allowed to heal before removal of the internal fixation, at which time a mild drainage completely disappeared. After three years, no further trouble was experienced by the patients.

CASE HISTORIES

Case 1. A. J. S., age 28, an oil field worker, sustained bilateral compound fractures of his lower legs in January 1955. An intramedullary nail was inserted in the left leg with primary closure. This wound healed as a simple fracture. The right leg was operated upon next. The wound was prepared by another doctor, and an Eggers plate was used with primary closure. Infection became evident after several months. The plate was removed, and the wound was debrided and closed except for a penicillin catheter. It healed with a moderate valgus. The patient has been working for sixteen months.

Case 2. A. M. L., age 26, fell 50 ft. from a rig in September 1956. He suffered compound comminuted

fractures of the right femur and left tibia and fibula. An intramedullary nail was inserted in the right femur with primary closure. The injury healed as a simple fracture. After this operation, a plate, screws, and primary closure with relaxing incisions were used in the left leg. The patient was working within seven months. Infection appeared in the right tibia. The plate was removed, and grafting will probably be necessary (figure 1).

Case 3. H. R., age 32, was in an accident May 1953 that resulted in an open wound resembling a Smith-Petersen incision. Primary closure was performed after insertion of an intramedullary nail. The skin healed by first intention but had a deep abscess requiring incision and drainage. Opaque media was then injected, scar tissue excised, and the bone curetted. Except for a very small sinus and occasional drainage, the wound healed. Seven months later, the nail was removed and drainage ceased. After four years, hip motion was somewhat limited but caused no trouble (figure 2, 3, and 4).

Case 4. G. W. C., age 32, suffered a severe, compound, comminuted fracture of the right tibia in November 1955. After insertion of an intramedullary nail and screw, primary closure was carried out with relaxing incisions. Wounds and bone healed. The patient was working in eight months and was well after two years.

Case 5. G. O'N., age 30, was injured in an oil rig accident in December 1953. When seen, the tibia was protruding and dirty underclothes covered the bone. Within five hours, an intramedullary nail had been inserted with primary closure. Two months later, low grade infection developed. Cultures were resistant to all antibiotics, but sulfonamides provided some control. The bone healed, and the nail was removed. Saucerization and skin graft were performed. Infection destroyed the union after sixteen months. A guillotine amputation was necessary. This case was a failure.

Case 6. J. A. H., age 45, an oil field worker, crushed his left leg in May 1956. His wounds were very severe with a comminuted compound fracture of the tibia. Primary closure was performed with traction on a Braun frame. When last seen after six weeks, the wounds had healed. Steinmann's pins were removed from both ends of the long leg cast, and the bone was found to be fairly stable (figures 5 and 6).

CONCLUSIONS

In my opinion, modern treatment of compound fractures should consist of proper preparation of the wound, adequate excision of devitalized tissue, primary closure of the wound with internal fixation when indicated, and proper use of antibiotics.

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Obstetric Emergencies in General Practice

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IN THE UNITED STATES today, about 85 per cent of deliveries are carried out by general practitioners, so the bulk of responsibility for maternal care lies on their shoulders. The importance of adequate prenatal care in reducing the number of obstetric emergencies seen in general practice cannot be overemphasized. In many cases, danger can be anticipated so that the astute practitioner may avert disaster or, at least, be prepared for complications when they arise. A carefully recorded general and obstetric history is no less important than the examination. Special attention to the weight of previous children and the correlation with present pelvic and fetal estimation often leads to anticipation of intrapartum dystocia. If a history of previous postpartum hemorrhage is obtained in a grand multipara with chronic anemia who is expecting twins, the possibility of further postpartum hemorrhage is obviously great. In a patient with a blood pressure in excess of 150/100 mm.Hg at her first prenatal visit or who reveals a history of hypertension from any cause in a previous pregnancy, the likelihood of losing her and her child in this pregnancy is increased, and the physician must be forever cognizant of the increased dangers, particularly from eclampsia and abruptio placentae.

Ideally, patients should be seen at least every four weeks up to the twenty-eighth week; from the twenty-eighth to the thirty-sixth week, every two weeks; and every week for the last month of pregnancy. Pelvic examinations should be performed at the sixteenth week for purposes of diagnosis, pelvic assessment, exclusion of ovarian cysts, and so forth and again during the thirty-sixth week for final assessment in regard to possible cephalopelvic disproportion. The patient should have an initial hematocrit, and her blood group, including Rh, should be known by her doctor. Every patient should be given a booklet

of general prenatal instructions. Diet, mineral, and vitamin supplements should be prescribed as required. Specialist advice should be sought as indicated and ancillary techniques, such as x-ray pelvimetry and placentography, utilized where necessary.

When a potentially dangerous case is encountered during the prenatal period and where adequate facilities are not available, the patient should be referred to the nearest maternity center. Any practitioner who is so isolated that he has no specialist help at hand for emergencies should be sure that he has at his disposal morphine sulphate, magnesium sulphate, sterile manual removal gloves, a pair of obstetric forceps with which he is familiar, and facilities for transfusion of a plasma substitute or, preferably, whole blood. In cases of severe hemorrhage, attention must be directed to staunching the flow with early and adequate replacement of blood loss.

"There are but two things that have much effect on me at labor—hemorrhage and convulsions." This statement, made by William Hunter two hundred years ago, is still largely applicable to obstetric emergencies today. Dewhurst's¹ review of 489 such emergencies in the Manchester area of England from 1947 to 1950 makes this amply clear (table 1).

HEMORRHAGE DURING PREGNANCY

Hemorrhage may occur from the decidua during pregnancy or from an associated lesion, such as a cervical erosion or polypus. Furthermore,

TABLE 1
NUMBERS AND TYPES OF CASES TREATED

Type	Number
Retained placenta	245
Postpartum hemorrhage and shock	143
Abortion	33
Eclampsia	23
Antepartum hemorrhage	9
Secondary postpartum hemorrhage	9
Other conditions	27
Total	489

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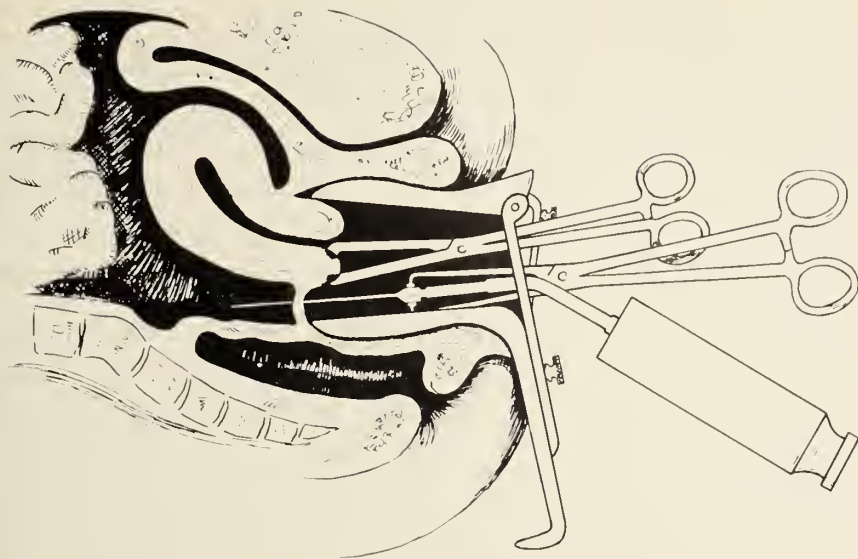


Fig. 1. Aspiration of non-clotted blood from cul-de-sac of Douglas with syringe and needle confirms diagnosis of intraperitoneal hemorrhage. (Diagram from Crews, R. L.: Culdocentesis at the Jackson Memorial Hospital—400 cases. *Am. J. Obst. & Gynec.* 75:914, 1958).

considerable bleeding may occur from vulvar or vaginal varicosities. As a general rule, none of these cause serious bleeding and the flow is readily controlled.

Abortion is the commonest emergency in early pregnancy, and 10 per cent of all pregnancies terminate in this way. This was the recorded cause of death in 266 women in the United States in 1955. Most bleeding occurs with the incomplete and criminal types, the latter type characterized by pyrexia and parametrial tenderness. Pelvic examination should be carried out as aseptically as possible. When bleeding is heavy, the cervical canal is usually dilated with the conception products present in the vagina or protruding through the internal os, but, in any case, as soon as incomplete or inevitable abortion is diagnosed, the uterus should be emptied without delay. Often, the products can be evacuated digitally or with the help of ring-type sponge forceps. In general practice, such cases may be adequately managed by giving 5 units ($\frac{1}{2}$ cc.) of Pitocin intramuscularly with $\frac{1}{6}$ gr. of morphine sulfate and repeating the Pitocin in one-half hour. Some prefer to use $\frac{1}{320}$ gr. of Ergotrate intravenously or intramuscularly in place of the Pitocin. I feel that Pitocin is more physiologic and that Ergotrate should be withheld until the conception products have been expelled and examined by the attending physician. When satisfied that abortion is complete, Ergotrate is then given parenterally. As a rule, we prescribe 0.2 mg. of Methergine orally every four hours for 6 doses to keep the uterus retracted. Occasionally, medical methods fail, and, in these cases, the patient should be

transferred to a hospital for surgical completion of the abortion. Furthermore, any patient who does not respond to antishock therapy should be transferred to a hospital immediately. Any patient who has had criminal interference should be given antibiotics and tetanus antitoxin and transferred to a hospital as soon as possible. In the last two groups of patients, lower nephron nephrosis is not uncommon, and these women should be watched carefully for the development of oliguria.

Ectopic pregnancy must be considered, especially the ruptured tubal variety. The symptom complex of 6 to 8 weeks' amenorrhea with vague colicky lower abdominal pains preceding by perhaps several days the onset of severe lower abdominal pain, sometimes with a shoulder tip element and associated with anemia and faintness, is well known. On physical examination, the finding of lower abdominal rebound tenderness in conjunction with a tender adnexal mass in a pallid, shocked patient strongly suggests the diagnosis. In early cases, the aspiration of non-clotted blood from the cul-de-sac of Douglas confirms the diagnosis. A syringe with a No. 16 spinal needle attached is all the equipment that is required. Anesthesia is unnecessary, although 25 to 50 mg. of Demerol may be given intravenously. Ruptured tubal pregnancy occurs about 20,000 times annually in the United States,² and 151 women died from this cause in 1955.³ Many of these would have been saved if this simple test had been more widely used (figure 1).

The patient should be treated for shock, if present, and transferred to a hospital for laparo-

tomy immediately after the diagnosis has been established.

Ulceration of the vagina should be borne in mind, particularly after attempts at criminal abortion by the insertion of potassium permanganate crystals. At Jackson Memorial Hospital, we see about 15 to 20 such cases annually; a few of these patients are in shock from heavy bleeding. This may occur if the patient uses a solution in which the crystals have not been allowed ten minutes to dissolve. A warm saline douche is given to remove residual crystals. A vaginal pack usually controls hemorrhage, but sometimes hemostatic sutures are required.

Carcinoma of the cervix occurs, according to Kistner,⁴ in about 1 in 2,000 pregnancies. Although rare, this is an occasional cause of severe hemorrhage. Speculum examination will reveal the cause, and cauterization with acetone in addition to a vaginal pack will control the flow until the patient reaches the hospital.

Antepartum hemorrhage in the last trimester should always be regarded seriously, and, even if bleeding is slight, patients are best transferred immediately to a hospital for full investigation. No vaginal or rectal examination should be performed, and even gentle speculum examination is better deferred until placenta previa has been excluded. When bleeding is severe, immediate blood replacement is required, and, if the facilities are available, transfusion should be started before or during transportation to the hospital. Painless bleeding in a multiparous patient with an abnormal presentation and high presenting part suggests placenta previa. On the other hand, abdominal pain with vaginal bleeding and a hypertonic and tender uterus in a preeclamptic primigravida is more suggestive of abruptio placentae. In a patient who has had a previous cesarean section, the possibility of a ruptured uterus must be borne in mind. Occasionally, vaginal and cervical lesions cause heavy bleeding as may rupture of the marginal sinus of the placenta or vasa previa. Generally, the specific diagnosis is not made until the hospital is reached, and, indeed, in about 30 per cent of patients, the cause remains undetermined.

Table 2, prepared by Ferguson,⁵ presents an analysis of 97 cases of antepartum hemorrhage among 2,251 deliveries.

In a dire emergency, when the cervix is only about 3 to 4 cm. dilated in the presence of placenta previa with the patient bleeding heavily, it may be possible to effect adequate tamponade by using the dead child in conjunction with scalp (Willett forceps) or leg traction. Vaginal packing increases the danger of infection and is of

little value in controlling hemorrhage. In these cases, all efforts should be directed toward blood replacement and delivery.

Ideally, only fully equipped hospitals with adequate resident staffs, including anesthesiologists and pediatricians, should accept cases of antepartum hemorrhage. The patient should be typed and matched for 1,000 cc. of blood upon admission. Immediate treatment depends upon the amount and persistence of bleeding. If bleeding stops, further treatment depends upon the location of the placenta and the maturity of the pregnancy. If diagnosis is in doubt, the patient is treated as a case of placenta previa.

Placenta previa. If bleeding stops, the patient should be kept under observation in the hospital until the fetus is about 2,500 gm. Speculum and vaginal examination should then be performed in an operating room with the patient prepared for immediate cesarean section, lest a central or partial placenta previa be found. Often, a patient with an anterior marginal placenta previa can be delivered vaginally following rupture of the membranes and dilute Pitocin infusion. When the placenta lies posteriorly and overlaps the sacrum, the true conjugate is more likely to be reduced, and cesarean section is often necessary. Soft tissue x-rays may reveal the placenta in the upper uterine segment, so that the vaginal examination need not be postponed even if the baby is small.

If bleeding continues or recurs and placenta previa is suspected, an aseptic vaginal examination should be performed in the operating room with the staff alerted for possible immediate cesarean section. This conservative approach, as advocated independently by Johnson⁶ and Macafee⁷ in 1945, together with the increased use of the abdominal route for the delivery of patients with placenta previa, has done much to reduce the maternal and fetal mortality.

Abruptio placentae usually presents a characteristic picture. Typically, it occurs in the pre-

TABLE 2
CAUSES OF HEMORRHAGE IN 2,251 DELIVERIES
FIRST AND THIRD QUARTERS OF 1954

Diagnosis	No. of cases
Rupture of marginal sinus	33
Cause undetermined	30
Abruptio	13
Cervicitis	10
Placenta previa	6
Low-lying placenta	4
Circumvallata placenta	1
Total	97

eclamptic patient and the bleeding is associated with abdominal pain of fairly sudden onset. The uterus is hypertonic and tender in proportion to the degree of concealed hemorrhage. In the severe case, an increase in the size of the organ is noted.

All patients with suspected abruptio placentae should be taken to the hospital if possible. Then:

1. Immediate preparations should be made for transfusion.

2. The uterus should be emptied as soon as possible. Sometimes cesarean section may be required, but often artificial rupture of the membranes and Pitocin infusion result in delivery in a short time. Prompt delivery reduces the possibility of hypofibrinogenemia and of renal glomerular and tubular damage.

3. In all cases, the clotting time and clot retraction should be observed. Ideally, hematocrit and fibrinogen estimations should be obtained. Where the latter is not available, the simple Fibrindex test is useful. Hypofibrinogenemia must be treated vigorously, and no surgical procedure should be started until this process has been checked. At least 4 to 6 gm. of Fibrinogen should be available as should blood, preferably fresh. Platelets and the AC globulin factor are useful but rarely available.

4. Hematocrit, blood fibrinogen, and electrolyte values should be carefully watched as well as renal function. At the first sign of oliguria, a protein deficient diet of the Borst⁸ or Bull⁹ type should be started.

5. If a Couvelaire uterus is found during cesarean section, some authors feel that hysterectomy is best performed because severe postpartum hemorrhage is common. Generally, however, prophylactic hysterectomy is unnecessary unless the uterus continues to bleed after evacuation and despite oxytocic therapy.

Rupture of the uterus occurs in about 1 of 4,000 deliveries. It is suggested by shock with sudden onset of "tearing" abdominal pain in a patient who has had a previous cesarean section. It is often associated with the careless use of Pitocin and may also occur as a result of an impacted shoulder presentation or traumatic attempts at internal version. Usually, the condition occurs during labor, and the constant pain is associated with the cessation of contractions. Abdominal tenderness and rigidity are more prominent with rupture of the upper segment. Vaginal bleeding is more frequently encountered in lower segment rupture. After the treatment of shock, immediate transfer to a hospital for repair of the uterus or, more probably, hysterectomy is imperative.

Vasa previa rarely endangers the life of the mother, but the fetal mortality is high. The diagnosis may be made before delivery if normoblasts are found in the stained vaginal blood smear. Usually, however, the diagnosis is only made after examination of the placenta, since the condition is most frequently found in association with a velamentous insertion of the cord.

Rupture of the marginal sinus rarely causes severe obstetric hemorrhage and is often diagnosed as abruptio placentae, although none of the stigmata of this much more serious condition is present except vaginal bleeding. The diagnosis can only be made after examination of the placenta.

PREECLAMPSIA AND ECLAMPSIA

In 1954, 2,105 women died as result of childbirth in the United States.¹⁰ Maternal killers in order of importance were: toxemia, sepsis, hemorrhage, heart disease, anesthesia, and malignancy. Despite the fact that toxemia of pregnancy heads the list, it is largely a preventable disease. On a basis of improved prenatal care, Hamlin¹¹ reported a reduction in the incidence of preeclampsia in Sydney from 10 per cent in 1946 to 1.8 per cent in 1951, and the frequency of eclampsia was at the same time reduced to about 1 in 7,000 pregnancies. The keystones in the prophylaxis of preeclampsia are simply dietary restriction to avoid excessive weight gain and bed rest for even the mild case.

While few could fail to appreciate the urgency of an eclamptic convulsion, the care of the preeclamptic patient often leaves much to be desired. While about 5 to 10 per cent of eclamptic cases are fulminant, most cases could be prevented by simple measures, such as a diet low in carbohydrate and sodium with the prescription of diuretics, sedation, Serpasil, and bed rest. When a patient shows a weight gain of more than 2 lb. per week or a blood pressure in excess of 140/90 mm. Hg with edema and albuminuria, hospitalization should be arranged if at all possible. The same arrangements should be made for patients with essential hypertension or chronic nephritis who show the slightest increase in edema or albuminuria.

Eclampsia is defined by the American Committee on Maternal Welfare as "the occurrence of convulsions and/or coma in a pregnant or puerperal woman when associated with hypertension, edema, or albuminuria." In about 90 per cent of cases, the development of eclampsia is heralded by severe frontal or occipital headache, visual disturbances, epigastric pain, and vomiting. The onset of oliguria in association

with the above is especially ominous. Hypertension, albuminuria, and edema are almost invariably present, although in fulminating cases the absence of the latter is a bad prognostic sign. The importance of intensive therapy in severe preeclampsia cannot be stressed too much, for, as soon as a pregnant patient has an eclamptic seizure, the danger to herself and her baby is enormously increased. All cases of severe preeclampsia and eclampsia are best transferred to a hospital. If eclampsia is present when the physician is called, the following routine is suggested:

1. Absolute bed rest in a quiet darkened room under constant surveillance by a trained nurse or doctor. The head of the bed should be elevated about 18 in. to reduce the possibility of acute pulmonary edema.

2. Oxygen by nasal catheter (6 liters per minute) should be administered if available.

3. A sphygmomanometer cuff should be kept continuously on the patient's arm, and the blood pressure should be taken every ten minutes or more often if hypotensive drugs are being used.

4. A Foley catheter should be inserted into the bladder and an accurate intake-output chart should be kept with special note made if urinary output is less than 20 cc. per hour. Total intravenous intake in twenty-four hours should not exceed 1,500 cc. plus output for the preceding twenty-four hours.

5. The urine should be checked every four hours for albumin—quantitatively if possible.

6. A hematocrit should be done daily if possible; also, nonprotein nitrogen, serum electrolytes, and blood sugar should be checked.

7. A No 18-gauge needle should be inserted into an arm vein, and blood should be withdrawn for type and crossmatch. An infusion set with a Y tube (so that blood can be run in if necessary) is attached to a bottle of 1,000 cc. of 5 per cent glucose in water containing 20 gm. of $MgSO_4$. If the patient is in the hospital or if the doctor is prepared to sit by the patient and "titrate" the infusion against blood pressure changes, then hypotensive drugs may be used. In our experience, the addition of 20 mg. of Apresoline and 5 mg. of veratrum alkaloids to the foregoing solution is most satisfactory. The infusion is started at 20 drops per minute and thereafter regulated according to response. If desired, additional magnesium may be given intramuscularly as 50 per cent $MgSO_4$ solution, while frequently checking the patient's tendon reflexes. Recent work by McCall and Sass,¹² Chesley and Pepper,¹³ and Hall¹⁴ indicates that magnesium sulphate is still the most potent antieclamptic drug.

8. The blood pressure should be taken every five minutes for the first two hours and then every fifteen minutes, and a level of 110-140/60-90 mm. Hg should be maintained if possible.

9. A single 250-mg. intravenous dose of Diamox may help by diuresis and promotion of an acidotic tendency.

10. The development of pulmonary edema and any tendency to aspirate vomitus should be watched. The nose and mouth must be kept free of secretions.

11. Tracheotomy is advocated if respiratory embarrassment from retained secretions occurs. Collins¹⁵ attributed the fall in maternal mortality in his series from 8 to 3 per cent largely to the introduction of this measure.

12. Fetal heart tones should be recorded every half hour. At the same time, the maternal pulse, respiratory rate, and tendon reflexes are recorded and the chest is auscultated as indicated.

13. If cardiac failure develops, or if the pulse rate exceeds 120 per minute, digitalis should be administered intravenously.

14. During the seizure:

- a. Loosen the patient's clothing if tight and restrain as gently as possible.
- b. Place a padded tongue depressor between her teeth.
- c. Slowly inject 0.25 to 0.5 gm. of Sodium Amytal intravenously. Avoid oversedation, especially with barbiturates, for their effects on the cerebral circulation closely resemble the effects of eclampsia.¹² If the respiratory rate is less than 14 per minute, don't sedate further.

When convulsions have been controlled for twenty-four hours, a careful vaginal examination is carried out to assess the capacity of the pelvis and the state of the cervix. If the cervix is favorable, labor is induced by rupture of the membranes without Pitocin, although the latter may be used with care. If the cervix is not "ripe," the patient should be transferred to the hospital and a cesarean section should be performed unless contraindicated by some special circumstance.

In cases resistant to intensive therapy, and especially in those characterized by fulminating onset, the pregnancy should be terminated as soon as possible. Even at the thirtieth week of pregnancy, the baby in an eclamptic mother has probably less chance in utero than it has in the premature nursery, while continuance of the pregnancy definitely jeopardizes the life of the mother. In the last few weeks of pregnancy, there should be no hesitation in emptying the uterus by induction of labor or cesarean section under local anesthesia.

The danger of eclampsia should be kept in mind during the first forty-eight hours post partum, and these seizures are treated as seriously as those in the ante- and intrapartum periods. Following delivery, oxytocics and estrogens should be avoided, and ice packs should not be applied to the abdomen for these tend to increase blood pressure.

15. When the patient becomes lucid, oral fluids should be forced and a low sodium, low carbohydrate, high protein diet is indicated if urinary output is satisfactory. Mild sedation should be continued, such as 1 gr. of phenobarbital every eight hours, and a 50 per cent solution of magnesium sulphate should be deeply injected into the gluteal muscles as required.

INTRAPARTUM EMERGENCIES

Prolapse of the cord occurs in about 1 of every 300 deliveries¹⁶ and is especially associated with prematurity, manipulations (such as version, surgical induction of labor when the presenting part is not engaged in the pelvis), a long cord, and any cause of nonengagement of the presenting part. Mengert and Longwell¹⁷ found this condition in association with about 14 per cent of shoulder presentations. The immediate danger to the fetus is obvious, but it should be remembered that the underlying cause may also endanger the mother's life as in cases of malpresentation, placenta previa, and so forth. Management should be to:

1. Rule out underlying complications which may be dangerous to the mother, for example, find out whether there is a history of bleeding or an obvious malpresentation.

2. Ascertain if the baby is alive from cord pulsation and fetal heart tones.

3. Ascertain the dilatation of the cervix.

If no underlying complications are present and the baby is dead, intervention is not required and the patient is allowed to deliver spontaneously.

If the baby is alive, the following first-aid measures are instituted: (1) the mother is placed in knee-chest or Trendelenburg position to reduce pressure on cord, (2) the presenting part is elevated by a hand in the vagina, and (3) oxygen is given to the mother if available.

Further management depends upon the stage of cervical dilatation. Thus:

1. If the cervix is dilated less than 3 cm., the patient should be transferred to the hospital with the first-aid measures continued meanwhile. Cesarean section would be the treatment of choice in these cases if facilities were available.

2. If the cervix is dilated 3 to 7 cm., the loop

of cord may be wrapped in sterile gauze and pushed above the presenting part, and a tight binder is applied to the abdomen. If, at this stage, the breech presents, one leg may be pulled down through the cervix to minimize the possibility of recurrence. Should shoulder presentation develop, gentle attempts at version may be carried out, but transfer to the hospital is preferable, since rupture of the uterus may result from iatrogenic trauma or impacted shoulder.

3. If the cervix is dilated 7 cm. or more, the baby should be delivered as soon as possible by careful version and extraction with the help of Dührssen's incisions placed at 10, 2, and 6 o'clock if necessary.

Dystocia. In any case of delayed labor, the general condition of the patient should be determined. The abdomen is examined to ascertain if the uterus is contracting normally and if tone and tenderness are within normal limits. At the same time, the presentation, attitude, position, and relationship of the fetus to the pelvic brim should be assessed. Any abnormality, such as twins or hydramnios, should be noted, and the fetal heart tones should be checked. Vaginal examination is carried out to assess pelvic capacity, cervical dilatation and effacement, and position and station of the presenting part during and between contractions as well to find out whether or not the membranes are ruptured and whether any tumor, including a full bladder, is obstructing descent. One adequate examination such as this saves many babies and mothers.

Delay in the first stage, whether from inertia or abnormalities of passage, should be recognized early. There is usually ample time for transfer to the hospital. Prolongation of the first stage of labor over twenty-four hours calls for intervention unless good progress is being made at that time. Fewer "failed forceps" are now being seen in cases of delay in the first stage of labor, and the greater number of cesarean sections has resulted in a better prognosis for mother and baby. Generally, Pitocin stimulation should not be used even in cases of hypotonic inertia unless the patient is in the hospital and under careful observation. Most "failed forceps" are due to attempts at delivery when a malposition, especially occipitoposterior, or even malpresentation is present; when the cervix is not fully dilated; when the presenting part is too high (thick caput); when obstruction to descent is present; or when a contraction ring is present, which is found in only 2 per cent of cases. The maternal mortality in cases of "failed forceps" has been reported as high as 5 per cent with a fetal mortality of 40 per cent. It is interesting to note

that after admission to the hospital, 85 per cent of the women are delivered vaginally, either spontaneously or by forceps. Only about 15 per cent require delivery by the abdominal route.¹⁸

Delay in the second stage of labor. Malpositions, such as occipitoposterior, rarely present difficulty unless the pelvis is small. In a primigravid patient, rotation to the occipitoanterior position and forceps delivery are usually required. In a multigravid patient, delivery in the posterior position by forceps is permissible, for the fetal head is already molded for this type of delivery.

Face presentation rarely gives trouble except in the mentoposterior position when rotation to the mentoanterior position is required before forceps extraction is attempted unless the child is premature or the pelvis is very roomy.

If the breech is allowed to deliver spontaneously until the shoulders are born, such complications as the nuchal position of the arms very rarely occur. Lovset's maneuver generally solves this problem, although deep anesthesia is required. The most important factor in successfully delivering the head, by whatever means, is the application of suprapubic pressure until the head is well down in the pelvis. If the occiput is in the posterior position, rotation to anterior is required before delivery of the head is attempted either by forceps or shoulder traction and suprapubic pressure.

If gentle attempts at conversion to vertex or breech fail in cases of shoulder or brow presentation with a mature child, transfer to the hospital is mandatory, for rupture of the uterus is likely. Embryotomy may be resorted to if no other treatment is available, but the danger of trauma to the mother is great.

POSTPARTUM EMERGENCIES

Early postpartum hemorrhage. Etiology:

1. Lacerations of vagina, cervix, and uterus.
2. Inertia—uterine atony associated with 86.6 per cent of cases of early postpartum hemorrhage.¹⁹
3. A tendency to postpartum hemorrhage as shown by multiparity or previous history.
4. Multiple pregnancy (large size and often inertia).
5. Faulty management of the third stage.
6. Fibromyomata—preventing adequate retraction of the uterus.
7. Ring constriction—retaining the placenta.
8. Abruptio (especially the Couvelaire uterus) and placenta previa.
9. Partial placenta accreta or attempts at removal of a complete accreta.

10. Inversion—occurs in 1 of 30,000 deliveries.²⁰

Prophylaxis:

1. Administer oxytocics intravenously with birth of the anterior shoulder or even post partum after ensuring that there is no twin. If available, blood should be given to replace loss.

2. Examine the vagina and cervix with a speculum after every delivery and repair lacerations.

Management:

1. Massage the uterus and express clots. Keep a hand resting on the fundus especially in obese patients.

2. Give oxytocics (Pitocin and Ergotrate) intravenously.

3. Manual removal of the placenta and exploration of the uterus should be carried out under 1/6 gr. of morphine administered intravenously if no other anesthesia is available. Examine the placenta after delivery to exclude succenturiate lobes or retained fragments which may cause further hemorrhage.

4. If rupture of the uterus, inversion, and so forth have been excluded, then compress the uterus bimanually with one hand on the abdomen and the other in the anterior fornix.

5. Give an intra-uterine douche with sterile water at 116° F. with a small quantity of iodine added.

6. Pack the uterus with oxidized cellulose gauze (Oxycel). This is much more effective than ordinary gauze packing. With a regular gauze roll it is difficult to pack the uterus effectively and instead of its acting as an adequate tamponade, it tends to act as a wick which conducts blood to the vagina.

After the uterus has been packed and the bleeding adequately controlled, the patient should be immediately removed to the hospital.

If bleeding is controlled, the Oxycel gauze need not be removed, for, after about forty-eight hours, the gauze liquefies and is expelled through the cervix. The patient's temperature frequently rises to about 102° F. on the third or fourth day despite prophylactic antibiotics. Occasionally, it is necessary to remove some Oxycel from the cervical canal about the third day in order to establish drainage.

7. If bleeding continues despite packing, laparotomy with repair of the uterus if ruptured, ligation of uterine arteries, or hysterectomy are carried out as required.

If inversion is present, shock is out of proportion to blood loss. An attempt at replacement should be made and the patient transferred to the hospital immediately, for the maternal

mortality, even in recognized and treated cases, is about 12 per cent.²¹

If, at the time of manual exploration of the uterus, a diagnosis of *placenta accreta* or partial accreta is made, attempts at removal should be abandoned, the uterus packed with Oxycel gauze, and the patient transferred to the hospital with shock therapy continued meanwhile.

Before leaving the subject of manual removal, it is interesting to note that many practitioners who embark upon a midforceps operation hesitate to manually remove a placenta. With care and antibiotics, the latter is by far the safer procedure.

Postpartum shock without hemorrhage may occur in patients in whom Credé expression of the placenta has been persistently attempted or to whom Pituitrin has been given. The possibility of pulmonary infarction should be borne in mind. The description by Lushbaugh and Steiner²² in 1942 has explained some cases of sudden death associated with acute respiratory embarrassment during labor or in the immediate postpartum period. The treatment is the same as for pulmonary infarction except that if amniotic fluid embolism is suspected (hypertonic contractions in labor, and so forth) and the patient survives, she should be watched for the development of hypofibrinogenemia.

Paravaginal hematoma should be suspected if the patient complains of perineal pain and shock develops some hours post partum. The diagnosis is readily made if perineal and rectal pain, persistent despite 1 gr. codeine, are investigated by vaginal and rectal examination. The hematoma must be evacuated and bleeding points ligated. The vagina should be packed with gauze to effect tamponade.

Ruptured perineum is not generally serious, even if the anal sphincter is involved, provided it is carefully repaired under aseptic conditions. If asepsis is in doubt, prophylactic antibiotics should be given. Confinement of the bowels post partum is not essential, but a low residue diet is desirable for an optimum result.

Secondary postpartum hemorrhage is due to retained placental fragments in a large proportion of cases—44.4 per cent of a series reported by Lester and associates¹⁹—and so many cases can be avoided if every placenta is carefully examined and manual exploration of the uterus is carried out where doubt exists. The management of such a case consists of treating shock with compatible blood and transferring the patient to the hospital. If bleeding is very severe, manual exploration should be carried out and the uterus packed. Oxytocics should be

given and transfer to the hospital effected because hysterectomy may be required.

CONCLUSIONS

A preventable maternal death is a tragedy unequalled in medical practice, and the memory of the wild-eyed father and whimpering motherless children is not easily forgotten. The appalling proportion of maternal deaths which are preventable is emphasized by careful analysis of maternal mortality reports.

The Minnesota Mortality Study²³ covering the period 1950 through 1954 illustrates this point only too well (table 3). In this study, 45 per cent of obstetric deaths were ruled preventable, and this rate was 2½ times higher in rural areas than in large cities where better hospital facilities were available. Hemorrhage constituted about 50 per cent of preventable deaths. About one-half of these were due to lacerations of the cervix or rupture of the uterus associated with the injudicious use of Pitocin, the perpetration of accouchement forcé, and the use of internal version when it was clearly contraindicated. The other half of hemorrhagic deaths resulted from failure to use oxytocic drugs, such as Pitocin, in cases of uterine atony. It is interesting to note that toxemia of pregnancy was the second most common cause of maternal death and that, in this group, most preventable deaths were due to failure to treat fulminating cases vigorously.

The following recommendations are made with a view to reducing maternal deaths:

1. All obstetric care should be based on the availability of a hospital with adequate facilities for blood transfusion, specialist consultation, and major surgery.
2. The importance of prenatal care should

TABLE 3
OBSTETRIC CAUSES OF DEATH AND PREVENTABILITY,
1950-1954

Causes of death	No.	Per cent	Per cent of total preventable deaths	
			Preventable	of total preventable deaths
Hemorrhage	48	27.1	37	46.8
Toxemia	36	20.3	13	16.5
Infection	25	14.1	8	10.1
Heart disease	13	7.3	3	3.8
Anesthesia	10	5.7	7	8.9
Amniotic fluid embolism	9	5.1	0	0.0
Air embolism	6	3.4	2	2.5
Chorionepithelioma	5	2.8	0	0.0
Others	25	14.1	9	11.4
Total	177	99.9	79	100.0

be realized in the selection of poor risk patients for specialist care and delivery in a fully equipped obstetric department.

3. In remote areas where hospital facilities are inadequate, a specialist-manned mobile emergency service should be set up. This team should be available at all times to assist the rural practitioner with obstetric emergencies. The

service should be based on a large maternity hospital and should have equipment for blood transfusions and major surgery aboard ambulance, boat, or helicopter.

4. In mountainous or island regions, a helicopter should be available for rapid transportation of patients to a hospital or of "the flying squad" to the bedside of the patient in extremis.

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FOR PELVIC REPAIR, buried dermal grafts are useful either to replace absent tissue or to strengthen existing fascia. Grafted tissue must (1) be similar in structure to the endopelvic fascia; (2) be capable of burial in the endopelvic fascia and able to develop its own blood vessels for survival; (3) blend into and become a functioning part of the endopelvic fascia; and (4) strengthen the receiving tissue and lend support to nearby structures. A full-thickness dermal autograft best fulfills these requirements.

Cysts seldom form from hair follicles or glands buried in the dermis. Follicles and glandular structures degenerate, but the parenchymal fibroblast cells and dense network of collagen fibers survive.

A thick epidermal skin flap is elevated from the abdomen with a dermatome. The dermis is removed in full thickness and placed in normal saline solution. The raised skin flap is then sutured back in place, and a pressure dressing is applied. A bloodless field should be maintained while the dermal graft is being placed.

In 2 patients who had cystoceles with stress incontinence and in 1 patient who had an enterocele with a prolapsed vaginal cuff, buried dermal grafts were completely satisfactory after eighteen and six months, respectively.

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Erythema Nodosum

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CASE REPORT

An 8-year-old Indian boy was admitted to Minneapolis General Hospital on February 11, 1957, with a two-day history of painful, swollen, red blotches on his shins. A week prior to admission, he had a slight cough for a few days, without fever, which was treated with proprietary cough drops. He was then in apparent good health until two days prior to admission when, after seeing a movie, he returned to his maternal grandmother's house and complained of pain in his legs. During the next few hours, he noted development of the eruption, fever of an undetermined degree, and increasing pain over his lower legs. He was seen the following day in the outpatient department and was admitted to the hospital for evaluation. He had no joint pain and no pain in any areas not involved by the skin lesions. He had taken no drugs or tonics. Past history revealed that he had a negative Mantoux test and a normal chest roentgenogram six months before admission. He was hospitalized at Minneapolis General Hospital in 1954 with typical scarlet fever. At that time, his Mantoux test with 1:1,000 old tuberculin was read as negative. During that admission, a grade 1 systolic murmur was noted. He had no recent sore throats. When an infant, the patient had a pneumonia which was not serious enough to warrant hospitalization. He had not previously experienced a similar skin eruption at any time, or had he ever had joint tenderness or swelling. The family history revealed that his maternal grandmother had "pleurisy" several months before his admission. She had no medical care for this illness. A stepsister of his mother was discharged from a tuberculosis sanatorium in 1955 after treatment for pulmonary tuberculosis. The patient had never been out of the State of Minnesota.

Physical examination revealed a well-nourished Indian boy who complained of pain in his legs whenever they were touched or moved. No joint pain or joint swelling was apparent. There were numerous warm, very tender, purple to yellow-hued lesions on both anterior tibial areas and over both anterior thighs (figure 1). These lesions were from 1 to 5 cm. in diameter. The tympanic membranes were scarred bilaterally but not acutely inflamed. Examination of the eyes, nose, and oropharynx was unremarkable. The neck was supple. The lung fields were clear to percussion and auscultation. There was a sinus tachycardia with the pulmonic second sound greater than the aortic second sound. There was no precordial bulge. A grade 1 to 2 systolic murmur was present over the pulmonic area and radiated to the entire precordial area. No thrill was palpable. There was no apparent cardiomegaly. The examination of the abdomen was not ab-

normal; the liver and spleen were not enlarged. No clubbing, edema, or cyanosis of the extremities was noted. The genitalia were normal. Neurologic examination was noncontributory. The blood pressure was 104/62/30, pulse 120, respirations 28, and temperature 103.8° orally. Lymphadenopathy was insignificant. Erythema nodosum was diagnosed from the typical appearance of the skin lesions.

Initial laboratory studies revealed a hemogram consisting of hemoglobin 11.9 gm. per cent, white blood count 16,950 with 78 per cent polymorphonuclears, 20 per cent lymphocytes, 1 per cent monocytes, and 1 per cent eosinophils. Sedimentation rate was 104 mm. per hour. Urinalysis was normal. The chest roentgenogram was reported negative. An antistreptolysin O titer of 333 Todd units (borderline significant in our laboratory) was also reported. The electrocardiogram was normal in every respect (P-R .12). Cultures of the nasal flora revealed a very occasional colony of *Staphylococcus*, and cultures of the throat revealed a mixture of organisms, including an occasional colony of beta hemolytic streptococcus on human blood agar. After forty-eight hours, the 1:1,000 old tuberculin skin test was strongly positive. Triple fungous skin tests were all negative after forty-eight hours (figure 2). The hospital course was marked by high fevers and leg pain which was helped somewhat by salicylates. February 21, 1957, he was transferred to the county tuberculosis sanatorium to await results of gastric washings. Subsequently, two gastric washings were reported positive for acid-fast bacilli. Repeat roentgenogram and electrocardiogram were normal. Treatment of the tuberculosis was begun with a regimen of 150 mg. of isoniazid daily and 4.0 gm. of para-aminosalicylic acid daily. Therapy was continued for one year. At present, he is asymptomatic, and his most recent sedimentation rate was 15 mm. per hour.

NATURE OF LESIONS IN ERYTHEMA NODOSUM

No better description of the lesions can be had than the English translation of Hebra's description of the disease¹—"Light-red raised nodules tender to the touch and mainly situated on the legs. In many cases, the eruption is preceded by a slight temperature elevation or even chills; often, however, the patient has no previous warning of the disease before he sees or feels the nodes. They occur as a rule in various sizes, the smallest the size of a pea and the largest that of a closed fist. The individual nodules are usually discrete and, at first, pale red with a faint gold tinge; at a later stage, they turn dark red, then livid, and, after the redness has disappeared, the lesions persist for a long time in the form of yellowish pigmentation. These shift-

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Fig. 1. Bruise-like nodose lesions on legs in all stages of evolution, diffusely involving the anterior tibial surfaces bilaterally. (Photograph taken on fifth day of hospitalization).



Fig. 2. Strongly positive 1:1,000 O.T. skin test on right arm seventy-two hours after intradermal injection. Note negative triple fungous skin tests after seventy-two hours on left arm.

ings of color are the same as those occurring after a bruise, and, for this reason, the name dermatitis contusiformis has been used by some authors."

CLINICAL MANIFESTATIONS

In the vast majority of cases, erythema nodosum is a self-limited entity. The average duration is less than six weeks. An occasional case may become chronic and persist for months or years.² Chronic cases occur very rarely in the pediatric population. In one series, 90 per cent of patients were fully recovered after eight weeks.³

About one-third of the patients manifest a mild anemia. The white blood count varies greatly, but a typical report reveals the following:³

White blood count	Per cent of cases
Less than 6,000	6
Between 6,000 and 10,000	42
Between 10,000 and 20,000	50
Above 20,000	2

The sedimentation rate is consistently elevated, and the average figure is about 80 mm. per hour (Westergren).⁴ In several large series, all patients had fever.^{3,5,6} The usual range was from 100 to 102°.

Phlyctenules and conjunctivitis have often been reported in conjunction with erythema nodosum.⁷ True joint pain is uncommon, but pain over the affected skin areas is almost universal. Several investigators who reported large series claim to have never seen associated arthralgia or arthritis. Although information is scarce, the incidence would appear to be higher in the winter and spring seasons. It is primarily a disease of the second, third, and fourth decades.⁸ The youngest patient reported was 7 months old. It is rare before the age of 2.

ETIOLOGY

Review of the literature reveals that erythema nodosum is associated with numerous diseases and drugs. The question of the mechanism of association has not been settled. As far as can be ascertained, all lesions of erythema nodosum of comparable age have similar histologic structure.⁹

The theory that the disease has but one etiology, that is, viral infection, which is in some way enhanced in the presence of certain infections and chemical environments has several proponents.¹⁰ There are some who favor toxic etiology and others who believe concurrent infections are responsible for erythema nodosum. However, a large segment of scientific opinion appears to embrace the theory that the disease is a nonspecific hypersensitivity reaction^{11,12} that can be triggered by numerous stimuli. Several histologic studies note striking similarities between the vascular lesions of erythema nodosum and periarteritis nodosa.¹³ The absence of complete obliteration of the arteriolar vascular channels in erythema nodosum prevents the fat necrosis seen in erythema induratum.

It appears that the predominant diseases associated with erythema nodosum—tuberculosis in Scandinavia,¹ streptococcal disease in the northern United States,^{11,12} coccidioidomycosis in California,¹⁴ and lymphogranuloma venereum¹⁵ and tuberculosis in India—are invariably correlated with disease frequency.

Treatment with sulfathiazole apparently increases the incidence of erythema nodosum in various diseases.^{16,17} This problem will be discussed later.

COMMON ASSOCIATED DISEASES

Tuberculosis. Most American authors conclude that tuberculosis usually is not the cause of erythema nodosum in the United States. On the other hand, authors from European countries feel the opposite viewpoint holds for the disease in Europe. In Stockholm, between 1942 and 1946, 58 per cent of the cases of erythema nodosum were associated with tuberculosis.⁸ In addition, this study revealed that in the younger age groups erythema nodosum was even more often associated with tuberculosis. In childhood, erythema nodosum occurred more often in males, while it was more often associated with females in adult life.⁸

In a series of 155 patients with erythema nodosum in Boston, collected over a thirty-year period, only 4 (2.5 per cent) had active tuberculosis.¹² Evidence has shown that pleurisy and postprimary tuberculosis are more apt to develop in a patient with a recently converted positive Mantoux test who also has erythema nodosum than in a person with a positive test who does not have erythema nodosum.⁷

A comparison of studies of erythema nodosum in various age groups points to the fact that tuberculosis is an important factor when erythema nodosum occurs in childhood but is a less common factor in adulthood.¹⁸

Streptococcal disease. For a time, erythema nodosum was considered to be a part of the syndrome of rheumatic fever. However, the literature over the past twenty years repeatedly reveals that erythema nodosum associated with rheumatic fever is an unusual occurrence. Several authors pointed out that a relatively large number of their patients proved to have beta hemolytic streptococci in their throat cultures. No control studies are available to show how many of their fellow patients had similar bacteriologic findings. The consensus of opinion is that both erythema nodosum and rheumatic fever may be sequelae to antecedent beta hemolytic streptococcal infection.¹⁹ This would explain the definite, but relatively rare, simultaneous appearance of these two diseases. Cutaneous injections of killed streptococci, streptococci broth filtrate, and streptococcal nucleoproteins are reported to have produced systemic reactions, such as malaise, myalgia, fever, and new nodules, in a high percentage of patients with erythema nodosum and positive throat cultures for beta

hemolytic streptococci. Concurrent erythema nodosum and acute rheumatic fever should be diagnosed only in the presence of active carditis and fulfillment of the other usually accepted criteria in the diagnosis of rheumatic fever.²⁰

Coccidioidomycosis. The relationship of coccidioidomycosis to erythema nodosum was not postulated until 1936.^{14,21} Subsequently, it was demonstrated that the disease was indeed found with primary coccidioidomycosis.²² Erythema nodosum appears very soon after sensitivity to the cutaneous coccidioidin test develops—two to seventeen days after onset of disease. It is of interest that in a series of 432 patients²³ with erythema nodosum and coccidioidomycosis, there were no cases of systemic granulomatosis, whereas 1 to 2 per cent of cases would be expected to progress to the systemic disease.

Other diseases. Erythema nodosum occurs in lymphogranuloma venereum when the Frei test is at its maximum reaction. There are occasional reports in which the disease is associated with lues, leprosy, trichophytosis, meningococcemia, rubeola, influenza, gonorrhea, pertussis, and sarcoidosis. Several authors question the validity of these reports, although the bulk of them are well documented.¹⁰

Erythema nodosum and drugs. Erythema nodosum has been seen in conjunction with numerous drugs, such as arsphenamine, salicylates, antimony, halogens, phenacetin, and sulfonamides—particularly sulfathiazole.¹⁸

Studies have shown that when sulfathiazole is given to patients with primary tuberculosis, erythema nodosum develops with much greater frequency than in control patients with primary tuberculosis.¹⁷ This phenomenon was also noted in conjunction with the treatment of streptococcal disease.¹⁶ The logical conclusion is that the drug is a provocative factor in erythema nodosum.^{15,24} Nevertheless, there are numerous cases in which the offending drug appears to be the primary causative agent. Certainly, no satisfactory explanation of drug action, aside from the general category of hypersensitivity reaction, is available at this time.

COMMENT

The simultaneous occurrence of tuberculosis and rheumatic fever is possible although improbable. The case presented in this paper included several laboratory reports which by themselves suggested acute rheumatic fever. However, on careful evaluation, the findings did not meet the criteria necessary to diagnose rheumatic fever in the face of the well-known accepted symptoms of erythema nodosum regardless of cause.

SUMMARY

The case of an 8-year-old Indian boy with erythema nodosum associated with primary tuberculosis is presented. A brief review of the clinical picture and etiology of this condition is also presented.

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ALTHOUGH THE INCIDENCE IS DEBATABLE, cardiac complications do occasionally occur with infectious mononucleosis. Five cases of acute pericarditis and acute myocarditis associated with proved infectious mononucleosis were recently reported.

An abnormal electrocardiogram is the most frequent finding. Irregularities include inverted and flattened T waves, occasional auriculoventricular conduction blocks, depression of the S-T segment, and nonspecific changes. Apical systolic murmurs, pericardial friction rubs, and cardiac failure are the most common physical signs.

The heart complications subside spontaneously in two to four months. Symptomatic supportive treatment should include bed rest until serial cardiograms indicate that the process is quiescent.

B. H. WEBSTER, M.D., St. Thomas Hospital, Nashville, Tennessee. *Am. J. M. Sc.* 234:62-70, 1957.

Fargo Tornado — Medical Aspects

MEDICAL DISASTER COMMITTEE,
ST. LUKE'S HOSPITAL,

Fargo, North Dakota

ON JUNE 20, 1957, a tornado swept through the northern section of Fargo, North Dakota, resulting in the devastation of 100 square blocks of the community, death of 11 persons, hospitalization of 26 individuals, and treatment of 141 patients in the emergency room of St. Luke's Hospital. The hospital was not damaged by the tornado. It has been suggested that the Disaster Committee of this hospital review its experiences in handling the medical aspects of this disaster as a benefit to other communities in planning similar disaster committees. This report will deal with 5 phases of the problem: (1) preliminary planning by the Disaster Committee to cope with the community disaster, (2) the immediate steps taken to care for patients after this area was stricken, (3) actual operation of the hospital and medical personnel during the influx of casualties, (4) a resumé of the types of cases encountered and their disposition, and (5) the measures deemed advisable in preparation for better management of possible future disasters.

PRELIMINARY PLANS

Prior to last year's tornado, the Disaster Committee of St. Luke's Hospital had formulated plans in anticipation of some local medical exigency. The first aid facilities of the local police, fire department, civil air patrol, and locally based North Dakota National Guard had been investigated. Discussions had been held with representatives of the community's private ambulance service. The physical facilities of St. Luke's Hospital had been evaluated by the committee in conjunction with key hospital personnel, and such topics as bed utilization, expansion of emergency room facilities, the use of nursing classrooms, and the emergency power facilities of the hospital had been considered. Broad plans were formulated, and, after this discussion, the hospital ordered additional fracture equipment for handling major injuries of the extremities. The

Members of the St. Luke's Medical Disaster Committee are: Dr. G. A. Dodds, chairman; Dr. D. T. Lindsay, Dr. H. A. Norum, Dr. P. O. Triggs, and Mr. Byron Jackson, hospital administrator.

various contingencies in the event of disaster had been considered and fairly detailed plans formulated. However, no actual dress rehearsal was conducted.

IMMEDIATE PREPARATION

The tornado which struck Fargo at 7:40 P.M. on June 20 had been well forecasted by the Weather Bureau, and the great majority of persons in the path of destruction had either vacated their homes or taken refuge in their basements. When the calamity became a reality, there were 4 staff physicians in the hospital, 2 of whom were members of the Disaster Committee. These men and the intern and staff resident of the hospital prepared immediately to receive an abnormal number of emergency cases. At this time, the electric power to the communities of Fargo and Moorhead was out and, as a result, the stand-by electric system of the hospital had immediately come on. A quick check of the emergency electrical outlets supply was made, and all vital services were operative except the elevators. There were no patients using Drinker respirators, and the patients using oxygen tents with electrical circulating fans were not in critical condition. It, therefore, was decided not to move any patients into the areas of the hospital in which emergency electrical outlets were available. All nursing personnel were furnished with flashlights, and, since the telephone system in the Fargo area was not functioning, messengers were dispatched to the homes of the key physicians and nursing personnel who would be needed to supplement the hospital staff. All available wheel litters from the upper four floors of the hospital were carried down stairways to the ground floor to be available at the ambulance and emergency room entrances. The hospital cafeteria was selected as the first major expansion facility to be used as an annex for our limited emergency room. Dining tables were grouped appropriately, mattresses were placed upon the tables, and working areas were designated. One of the adjacent nursing classrooms in a wing of the hospital was prepared as an emergency treatment room. The second nursing

classroom was made accessible but was not required. Extra supplies of sterile dressings and suture sets were made available to the emergency room areas. Several private rooms of the hospital were converted into double rooms, and, in a very short time, a full complement of nursing and operating-room personnel were ready and at their stations. Off-duty nurses responded without being summoned. The need for additional manual help to supplement the various vital functions of the hospital was met without difficulty by the large number of volunteer laymen who, with some technical competence, reported voluntarily from the immediate neighborhood and other areas of the community. Every department of the hospital was well supplied with help.

The actual care of tornado casualties began with the arrival of a police squad car carrying a man with a laceration of his back, his clothes in tatters, and both the patient and his rescuer completely covered with filth. It was evident that shortly there would be an unusual number of hospital admissions, so a physician from each hospital service checked the inpatient bed load and arranged for immediate discharge of those patients whose condition did not actually require them to remain hospitalized. This freed several beds which subsequently were occupied by tornado casualties. The casualties arrived by ambulance, private cars, fire truck, police squad car, on foot, and being carried by their friends and neighbors. A number of the injured children and a few adults were unidentified for several hours. Emergency medical tags for identification and recording the preliminary care were improvised by a member of the hospital record librarian staff. These tags proved invaluable. The medical condition of the casualties was evaluated as quickly as possible by the first physician who met them on arrival. The name and diagnosis of the patient was placed upon the identification tag, and temporary disposition was given to the case. Those with obviously serious injuries were admitted to the hospital or directed to an appropriate location in the hospital for further specialized care. Persons with minor injuries were asked to take a place and wait for further definitive therapy. Forty-five patients were sent to the x-ray department for radiographic studies, and persons with contusions and lacerations were treated by methods deemed appropriate at the time. Several of the more seriously injured persons were those with skull fractures and associated cerebral damage, which resulted in severe convulsions. These patients were given the highest priority of first aid and

medical care. All patients with penetrating wounds were treated with prophylactic tetanus antitoxin or with toxoid if they had been in the armed services. The less severely injured people who had to wait for medical care never complained. One outstanding observation was the complete lack of hysteria on the part of any of the injured individuals or their families. In spite of the fact that approximately 60 to 70 patients entered the emergency room within the first hour and one-half after the disaster occurred and were often accompanied by members of their immediate families, in most instances, there was little confusion.

OPERATION OF THE HOSPITAL

One of the most surprising aspects of the medical care was the large number of professional persons who appeared at the hospital without being called. Thirty or 40 physicians worked together on the emergency cases, and many from the staff of St. John's Hospital, Fargo, responded immediately to offer their services. The full daytime staff of St. Luke's Hospital and all key individuals from the business office, pharmacy, laboratory, radiology department, record librarian's office, hospital administrator's office, and the engineering department were present. Many volunteers gave manual assistance in moving beds, litters, mattresses, and oxygen tanks and the many other jobs requiring a strong back and a person able to follow directions. The possibility of confusion was controlled by the excellent work carried out by the hospital record librarian and her staff who kept a complete account of all patients admitted to the emergency room of the hospital, their addresses, the diagnosis of their difficulties, and the disposition of their problems. This information was kept up-to-date and immediately transmitted to representatives of the local television and radio stations who, in turn, put the information on the air. This resulted in a minimum of inquiries direct to the hospital telephone switchboard. The medical record librarian of the hospital acted as the liaison agent between the hospital and the various news-gathering agencies. We cannot emphasize too strongly the very valuable help these agencies can render at the time of a disaster and the necessity of maintaining close coordination with them. A complete roster of all persons injured and their conditions was available within three hours after the tornado struck the city. At the end of this period, the halls of the hospital were cleared. All patients had been either admitted to the hospital or sent home.

TYPES OF CASES

On the evening of the disaster, a total of 67 patients were seen in the emergency room of St. Luke's Hospital, 26 of whom required hospitalization. The breakdown on the type of case seen is given in table 1. The following day 74 additional patients were treated in the emergency room. A breakdown of these cases is presented in table 2. It was interesting to note the many puncture wounds from nails. The majority of these wounds were in the feet, which occurred when people walked around in the dark amidst the debris of the tornado trying to recover their possessions. Altogether 141 patients were treated in the forty-eight-hour period. It was noted that the majority of the lacerations became infected, which again emphasizes the fact that such wounds should have been treated by delayed suture rather than primary closure. No cases of tetanus developed.

It is worthy to mention that the press raised the question of medical fees in the handling of these unfortunate tornado victims. This inquiry was prompted by the unfavorable publicity the medical profession had been receiving in the East at that particular time in a case which was receiving nationwide attention. The local medical profession decided not to charge any victim of the tornado a professional fee for the emergency medical care rendered. The only exceptions were patients who would require a prolonged hospital stay. This decision resulted in a very favorable editorial to the profession from the area press.

FUTURE PLANS

A review was held by the Disaster Committee two weeks after the Fargo tornado, and, in light of our past experience, several additions to our disaster plan were made. We felt that the relative success of the recent tornado medical care program was largely due to the fact that it was a limited disaster as far as injuries were concerned, with a relatively large amount of professional help to care for these cases. It was our feeling that in a more extensive catastrophe, serious weaknesses would have developed in our planning. At present, our program is organized under two headings—the hospital administrative section and the medical section. First, in considering the administrative duties, the most important requirement is a ready supply of medical identification tags with carbon or detachable duplicates for purposes of keeping track of the names and types of casualties arriving. In addition, persons should be assigned to interview members of the family and others inquir-

ing about the condition of patients. A section must be set up as a radio and press information center. Personnel of the hospital administrative office must be present to attend to the innumerable details requiring immediate decisions in coping with the unusual problems arising. Hospital nursing service must arrange for extra nursing coverage, recruitment of volunteers, and the assignment of student nurses and graduates. Special duty nurses for critically injured patients must be provided. In the event of an extraordinary catastrophe, the system used in the military services of resupplying ambulances and first-aid vehicles should be anticipated. Patients transported to the hospital in splints will deplete the first-aid supplies of the vehicle bringing them, and an exchange of equipment must be arranged so that these vehicles can continue to function effectively.

TABLE 1
PATIENTS SEEN AND TREATED THE EVENING OF THE
TORNADO, JUNE 20, 1957

	<i>Admitted to hospital</i>	<i>Examined and/or treated</i>	<i>Total</i>
Abrasions and contusions	4	7	11
Burns		1	1
Fractures:			
Humerus, ribs, vertebra	1		1
Ankle, pelvis, vertebra	1		1
Femur, humerus	1		1
Clavicle	1		1
Fibula	1		1
Radius		1	1
Ribs		1	1
Multiple		2	2
Foreign bodies		1	1
Head injuries	10	1	11
Lacerations	1	10	11
Observation	6	16	22
Puncture wound		1	1
Total	26	41	67

TABLE 2
PATIENTS SEEN IN EMERGENCY ROOM JUNE 21, 1957,
FROM CLEAN-UP AREA

Abrasions and contusions	11
Burns	1
Foreign bodies	3
Possible fractures	2
Lacerations	8
Puncture wounds from nails	37
Observation	12
Total	74

In the present disaster, no item of equipment was in short supply. However, in a calamity of greater proportions, a reserve supply of military type canvas stretchers would make it much easier to carry patients up and down stairways in the event elevator services were interrupted. Furthermore, these pieces of equipment are readily stored and, if necessary, could serve as beds. In our experience, patients with severe head injuries comprised a significant proportion of cases, and we found ourselves short of readily portable oxygen equipment which could be utilized while these patients were undergoing radiographic studies and being moved from the emergency room to their hospital room or from there to the operating room. Only small portable oxygen tanks with face masks will properly serve this purpose. The final facility which would be most desirable in the event of an extensive disaster would be a communication system between the hospital and the actual disaster area, permitting physicians caring for these patients to make suitable advanced plans. Radio communications direct to ambulances and police vehicles in the field would be extremely helpful in order to inform the medical staff of more extensive expansion. This communication system should be powered from the hospital's emergency generator.

From the medical standpoint, the most important thing is a team of physicians whose sole function is to sort and direct the flow of casualties upon arrival at the treatment center. A second team of physicians and nurses should clean up the patients and their wounds so that a more adequate evaluation of the problem can be established. The problem of patients covered with debris was very acute in this instance. A third team of physicians and nurses should handle the minor injuries and wounds of patients not requiring hospitalization. The more seriously injured patients suffering from shock are best treated in an area designated as a "shock ward" prior to their definitive hospital admission. This area should be away from the commotion produced by the flow of persons with minor injuries. It seems to us that a team of individuals to administer tetanus prophylaxis and record the same on the patient's medical tag would be valuable. In a disaster not involving burns, the department of radiology is indispensable and requires an

adequate number of x-ray technicians directed by a physician and an extra supply of orderlies and messengers to direct the influx of patients. It is mandatory that the x-ray department have auxiliary power facilities in the event that the municipal electrical system fails. Many patients with minor uncomplicated fractures could well be treated without admission to the hospital by application of plaster casts in an area adjacent to the emergency room. These patients could be treated by immediate fixation in plaster, with the roentgenograms obtained as a matter of record, without sending them to the radiology department before plaster is applied. This would eliminate some confusion and duplication of effort. Cases requiring treatment in the operating room are, of course, admitted to the hospital and, preferably, all casualty victims should be admitted to one floor or unit of the hospital. Someone in authority should have the responsibility of determining the priority of care in the operating room. This task would fall to the chief or the acting chief of the surgical service of the hospital. Nonsurgical problems would be supervised by floor physicians working under a medical chief.

CONCLUSION

In setting forth the preceding information, the members of the St. Luke's Hospital Disaster Committee have purposely not referred to the many excellent monographs and government bulletins available on this subject. We are familiar with their contents but have limited our comments to the results of our own experience. We appreciate that it is a difficult task to persuade people to plan realistically for a catastrophe, but the time spent in proper planning will be well rewarded if misfortune strikes. We feel that good plans made for a calamity of small magnitude can be heartily supported by laymen and professional people alike and that we do not need to think in terms of a national emergency to justify a complete disaster plan for a community hospital. The Fargo tornado has heightened the interest of our community and our professional people in preparation for sudden and extraordinary misfortune, and, as a result, our own efforts in the future will be considerably more effective than in the recent past.

Harold Sheely Diehl, M.D.

By J. ARTHUR MYERS, M.D.

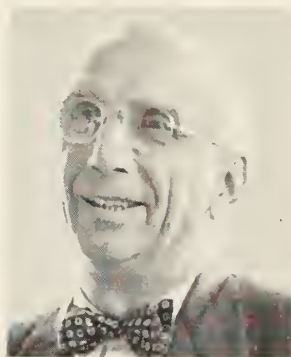
WHEN A PHYSICIAN makes notable contributions over several decades, it is appropriate that a summary of his life and accomplishments be brought to the attention of the medical profession. In such a life, there often is much that others can emulate to their great advantage. This is especially true of the life of Harold Diehl. He was born in Nittany, Pennsylvania, on August 4, 1891, attended public schools at Nittany and Middleburg, and was a student at the York Collegiate Institute, York, Pennsylvania, in 1907 and 1908. He entered Gettysburg College from which he received the degree of Bachelor of Arts in 1912. For the next two years, he was assistant principal and teacher of mathematics in the high school at Fulton, New York.

After spending the summer of 1914 at Syracuse University, he entered the University of Minnesota School of Medicine. This was made possible by carrying a part-time teaching position in chemistry at Augsburg College in Minneapolis. In 1918, he received the degree of Doctor of Medicine and served as intern and physician in France with the United States Base Hospital 26 in World War I. From 1919 to 1920, he was Director of the Northern Division of the American Red Cross Commission to Poland. He then entered the University of Minnesota Graduate School and received the degree of Master of Arts in medicine in 1921. That year the Polish government awarded him the medal of Polonia Restituta. In 1935, Gettysburg College called Dr. Diehl back to bestow upon him the honorary degree of Doctor of Science.

In 1921, he became director of the Student Health Service, University of Minnesota, and instructor in Pathology and Public Health. He was made assistant professor of Preventive Medicine and Public Health in 1922, was promoted to the rank of associate professor in 1924, and was made professor in 1929.

In 1935, he resigned the directorship of the Student Health Service to become dean of the Medical Sciences and continued in this capacity through 1957 when he was granted a leave of absence to accept another position.

Dr. Diehl organized the Department of Preventive Medicine and Public Health in 1922 and served as its head until 1936 when he invited Dr. Gaylord Anderson of Harvard University to take over this department. Since that time, he has continued his appointment in this department, and he participated with Dr. Anderson in founding the School of Public Health in 1944.



HAROLD SHEELY DIEHL.

On September 7, 1921, he married Julia Louise Mills, who was then a teacher of Home Economics. Their children, Annabelle and Antoni, are contributing significantly to the promotion of good health. Annabelle is a graduate of Vassar College. She earned a Master of Arts degree in Medical Social Work from the University of Minnesota, then pursued this profession for several years. Her husband, Dr. R. P. Bush, is an outstanding psychiatrist. Antoni is an assistant professor of Pediatrics at the University of Kansas Medical School. He has a special research and clinical interest in rheumatic fever and cardiology. His wife, Sybil, is a graduate of the Peter Bent Brigham School of Nursing. The Diehls also are proud of their 7 grandchildren.

Special tribute must be paid to Dr. Diehl's wife, Julia. It is doubtful whether any woman ever contributed more importantly to her husband's success. She kept constantly informed on the details of his work, promoted good will from their home to all members of the faculty and their families, and was ever ready to participate in any and every activity to advance the welfare of the School of Medicine. On the occasion of the presentation of his portrait, Dr. Diehl said, "First of all I want to acknowledge the credit that rightly belongs to Mrs. Diehl. For thirty years she has not only made a splendid home for our family but also has helped, encouraged, and supported me in my work. She has been superb, not only as a companion but also as your dean's wife."

The Student Health Service at the University of Minnesota was first organized in 1917 under the direction of Dr. John Sundwall. Four years later, when Dr. Sundwall accepted a position at the University of Michigan, Dr. Diehl took over the directorship of this infant organization. His superior administrative ability was immediately in evidence, and the Student Health Service soon ranked among the best of such organizations. In addition to a large full-time medical, nursing, and clerical staff, he had every important specialty in medicine represented by part-time physicians who were in private practice. An arrangement was also made whereby members of the University Hospital staff were available for consultation and special procedures including surgery. Uppermost in his mind always was the best possible medical care for the student body.

Dr. Diehl was one of the moving spirits in organizing the American Student Health Association, now known as The American College Health Association. In this organization, he was active in promoting formation of Student Health Services in various colleges and universities throughout the country. He was president of the organization from 1927 to 1929. He also participated in organization of regional health service associations and presided over the North Central Association in 1932.

While directing the Student Health Service, Dr. Diehl constantly conducted research and encouraged and promoted such activities by his staff members.

TUBERCULOSIS CONTROL WORK

He also initiated and promoted some of the most important tuberculosis control work in this country. The first student health service tuberculosis clinic was established in the University of Minnesota.

His keen interest in tuberculosis had been established early in his school days. When he was a freshman, his anatomy dissecting partner died from tuberculous meningitis, and, throughout the remainder of his medical course, he saw other students drop out of school because of this disease. Therefore, when the opportunity came, he struck tuberculosis with all of his might. From 1921 to 1927, he observed the cases found among students, a preponderance of whom were in the schools of nursing and medicine. He promoted the administration of the tuberculin test to all students entering the University in 1928. This revealed that only 33 per cent were infected instead of 100 per cent as was generally believed and taught. Moreover, all the clinical cases were derived from that 33 per cent.

In 1929, he arranged to examine two classes from the schools of medicine, nursing, and education each year they were in school. This included the usual physical examination, the tuberculin test, and fluoroscopic and roentgen film inspection of the chest. From the beginning, this study was most revealing. He immediately began working on plans for making chest x-ray film inspection of all students who reacted to the tuberculin test on admission. This was

accomplished in the fall of 1931. So much clinical tuberculosis was found that the test became a permanent part of students' entrance examination.

In 1932, Doctor Diehl said, "It should be possible by extending such a program to the entire student body or to any other group of individuals to diagnose all tuberculosis in its truly curable stage and to prevent individuals in the group from transmitting the infection to their associates."

The 1929 study provided a unique opportunity for research in tuberculosis. Periodic examination of students infected before entering the school eliminated those who already had clinical disease on admission and found those in whom such disease evolved while they were in school. This prevented tuberculous students from infecting others.

Periodic testing with tuberculin of the uninfected provided information as to the interval between exposure to contagious cases and the development of sensitivity of tissue as well as the appearance of demonstrable lesions with reference to prevalence and nature of lesions. Knowing that when students became reactors to tuberculin they had been in contact with persons who had contagious disease, the sources of their infections were sought.

This study demonstrated that numerous persons who were being admitted to general hospitals with various authentic diagnoses also had coexisting, contagious, and frequently unsuspected tuberculosis.

No sooner had Dr. Diehl become dean of Medical Sciences in 1935 than he attacked this problem. The first step consisted of administering the tuberculin test to all patients admitted to the University Hospital and making x-ray film inspections of the chests of the reactors. So many cases of clinical tuberculosis were found by this admission examination that it soon was adopted as a routine procedure. Today it is employed by the hospitals in Minneapolis and St. Paul and administered to 80 per cent of all persons being admitted to Minnesota hospitals. Its value has been so thoroughly proved that this procedure is now recognized by hospitals everywhere.

The second step was the examination of all hospital personnel with tuberculin and making x-ray films of the chests of the reactors. This revealed contagious cases in persons, such as librarians, maids, and orderlies, in such numbers as to require pre-employment examination and subsequent semiannual examinations.

In order to further protect students of nursing and medicine, rigid contagious disease technic was developed and employed wherever and whenever tuberculous patients were in the hospital. This technic has also been adopted by all general hospitals in this area. Students were warned against working with cases of tuberculosis in the absence of such technic.

The effectiveness of this program rapidly became evident, first in a precipitous decrease in the infection attack rate among students who had entered school uninfected as well as in morbidity and mortality rates. For example, among the students graduating from the School of Medicine in the classes of

1919 to 1932, it was found that 92 had developed demonstrable tuberculosis and 11 had died. Whereas, in the classes graduating from 1943 to 1957, only one student of medicine had a lesion evolve to x-ray shadow-casting proportion.

Of Dr. Diehl's numerous accomplishments, probably none will be responsible for the prevention of more invalidism and more untimely death than the fundamental method he developed for protecting students of nursing and medicine and other hospital personnel from tuberculosis. His method is applicable to every hospital, every school of nursing, and every school of medicine in the world.

RESEARCH WITH THE COMMON COLD

Dr. Diehl is widely known for extensive research on the common cold, conducted throughout most of the years he directed the Student Health Service. His interest in this problem has continued, and his numerous writings on the subject are authoritative.

INAUGURATION OF COLLEGE BUILDING PROGRAM

When he became dean of Medical Sciences, he inaugurated a building program for the college which, over a period of twenty years, has doubled the physical facilities of the school. In addition, he has provided staff and equipment for his school so that it is now regarded as one of the finest medical institutions in the world.

By 1957, Dr. Diehl had made final plans for a new medical-biological library on the Medical School campus, and the Masonic Cancer Hospital was under construction. Plans were being completed for the Clinical Cancer Research Institute provided by Veterans of Foreign Wars, for greatly expanded research laboratories, for an additional story for the Heart Hospital, and for complete remodeling of Millard Hall and Jackson Hall — two of the original buildings on the medical campus. All of this was bringing to culmination what he considers an adequate medical center for care of patients, teaching, and investigation.

CONTRIBUTIONS TO NATIONAL MILITARY AND HEALTH AFFAIRS

In addition to service in World War I, Dr. Diehl later contributed significantly to military and health affairs of this nation. He was a member of the National Advisory Health Council from 1937 to 1941. This council is advisory to the surgeon general of the United States Public Health Service on policies and programs of the service. From 1940 to 1941, he was a member of a committee on medical education of the Office of Emergency Management in Washington. This committee arranged for the program of deferment of medical and premedical students and medical faculty members during the period of military drafts and prior to the start of World War II.

From 1941 to 1946, he was a member of the directing board of the Procurement and Assignment Service of the War Manpower Commission and was chairman of the Committee on Allocation of Health

Personnel. This board, with Dr. Frank Leahy as chairman, was responsible for formulating policies and making plans of operation to assure the best possible distribution of health personnel to meet military and civilian needs. The Committee on Allocation, of which Dr. Diehl was chairman, prepared the actual data for staffing medical schools, health departments, wartime industrial establishments, and civilian practice as well as the military services.

From 1950 to 1957, he was vice chairman of the Health Resources Advisory Committee of the Office of Defense Mobilization. This committee made plans and outlined policies for the most effective utilization of the health resources of the nation in case of national emergency. It organized the national blood program and the stockpiling of medical and health supplies and passed upon requests of all military departments for the withdrawal of physicians, dentists, and nurses from civilian practice for military service.

During this time, he was also vice chairman of the Medical Advisory Committee of the National Headquarters of Selective Service. This committee, operating through state and local committees, recommends to Selective Service upon the availability of individual physicians, dentists, and nurses who are liable for military service.

He played a prominent role in the reorganization of the medical services of Veterans Administration Hospitals, with provision for affiliation of these hospitals with medical schools. In fact, the affiliation between the University of Minnesota Medical School and the Minneapolis Veterans Administration Hospital was a pilot experiment in this program and served as an example or model for the extension of the program throughout the country.

Dr. Diehl devoted a tremendous amount of time to these various national organizations. For example, the National Advisory Council of the United States Public Health Service met once or twice a year. The Directive Board of the Procurement and Assignment Service met once or twice a month, and the Health Resources Advisory Committee and the National Advisory Committee of the Selective Service met twice a month from 1950 to 1955 and once a month from 1955 to 1957.

From 1946 to 1952, he was a member of the Advisory Board on Health Service of National American Red Cross. He has served as honorary consultant to the surgeon general of the United States Navy since 1955. He also served on the Medical Advisory Panel of the United States Office of Vocational Rehabilitation. He was a member of the United States Delegation to the World Health Assembly in Geneva in 1954 and in Mexico City in 1955.

For many years, he has been a fellow of the American Public Health Association and was a member of the Governing Council from 1946 to 1950. He is a fellow of the American Medical Association and was chairman of the section of Preventive Industrial Medicine and Public Health from 1938 to 1940. He has been a member of the American Med-

ical Association Council on National Defense since its establishment in 1950 and chairman since 1955. He is Chairman of the Committee on Medical Education and Hospitals, Minnesota State Medical Association. He has long been a member of the boards of his county and state tuberculosis associations. In 1956 and 1957, he was vice-president of the Association of American Medical Colleges.

Dr. Diehl holds membership in many other organizations including the Central Society for Clinical Research, the American Association for Advancement of Science, the Minnesota Academy of Science, the Minnesota Academy of Medicine, the Minnesota Society of Internal Medicine, and the Minnesota Public Health Conference and Phi Delta Theta, Nu Sigma Nu, Phi Beta Kappa, Alpha Omega Alpha, and Sigma Xi fraternities.

LITERARY ACCOMPLISHMENTS

It is unfortunate when a physician who has opportunities to make contributions to medical knowledge does not record them in medical literature. The medical world is fortunate in that Dr. Diehl has recorded in medical journals and books his numerous observations on methods, procedures, and results obtained. There is no substitute for experience. With approximately forty years of experience as a physician, Dr. Diehl has spoken and written with ever increasing authority. Careful perusal of the bibliography of approximately 200 references included in this sketch provides an insight of the tremendous volume of work he has done and informs readers of the phases of medicine in which he has worked most.

Many physicians who write do so only for medical readers. In addition to such laudable writing, Dr. Diehl has always envisioned the importance of transmitting health information to the public. His long and broad experience admirably qualified him for writing the book, *Healthful Living*, published in 1935. This book is dedicated "To those who prefer facts to fads, sanity to superstition, understanding to belief." The sixth edition is now in preparation. This has become a textbook in personal hygiene in many colleges and universities throughout America. Thus, the broad and long experience of one who has contributed so much to the welfare of humanity is being passed on to thousands of students who, in turn, are disseminating it among their contacts to the end that the common desires of mankind everywhere—to live long, happily, and efficiently, ever contributing to the good of the world—will be achieved.

PRaise OF ASSOCIATES AND FRIENDS

On October 8, 1951, the Medical School faculty presented the University with a portrait of Dr. Diehl, which has been placed permanently in the faculty room of the Mayo Memorial Building. In making the presentation, Dr. E. T. Bell, emeritus professor of pathology, concluded "It is a tribute to the best medical dean Minnesota has ever had, and, even more importantly, it is a token to Harold and Julia of our deep affection." President Morrill closed his accep-

ance remarks as follows, "Dean Diehl has brought leadership of the highest order to the College of Medical Sciences and thereby to the University.

"On behalf of the Regents, I am delighted to receive, Dean Diehl, from your colleagues this manifest and living memorial of your devotion and achievement."

A few of Dr. Diehl's close associates have kindly contributed to this sketch by the following brief personal evaluations of his life and work:

Dean Diehl's distinguished administrative leadership in medical education and research has been a massive building stone in the structure of the University of Minnesota.

With patient and productive persistence, he has brought the College of Medical Sciences at our University to acknowledged eminence among the great medical centers of the nation and the world. With rare insight he has appraised the capacities and recruited the services of a group of medical scientists, teachers, and researchers whose high competence is universally acknowledged and has given them encouragement and support to assure their splendid accomplishments.

In the development of medical school physical facilities and equipment through public and private assistance, his efforts have been notably sustained and rewarded—these are a monument to his industry and devotion.

In the long history of the University, Dean Diehl's career will shine as a beacon of strength and integrity and example.

J. L. MORRILL, President
University of Minnesota

For a friend to write an appraisal of a friend is, in a sense, a strange deed. Did I hold Harold Diehl as a friend in spite of serious faults, I would write nothing. In actuality, space limits my words but not my sincerity. As my father and my uncle before me, I hold deep respect and admiration for the abilities, accomplishments, and loyalty of Harold Diehl. The high and enviable place that the Medical School of the University of Minnesota holds is due in great measure to his efforts. Minnesota is much richer for his having been a resident here and having been Dean of our Medical School.

To his wife and to him, long life, health and happiness in continuing service to others.

CHARLES W. MAYO
Mayo Clinic

To one who has had the privilege of working closely with Harold Diehl over many years, there are three characteristics which stand out above all others—first, his unique ability to select young men and women of promise; second, his unusual capacity to provide opportunities for these staff members to develop their full potentialities; and third, his warmth and friendliness.

Always generous with encouragement, enthusiastically interested in new ideas, patient and understanding of personal problems of his staff, he has aided and guided the development of many outstanding physicians and medical scientists.

This interest in able young people plus the rare ability to generate an atmosphere of friendliness and cooperation among the staff are significant reasons why the University Health Service and Medical School became outstanding under his leadership.

RUTH E. BOYNTON, M.D.
Director, University Health Service

I have worked for and with Harold Diehl since our days together in Base Hospital 26 in World War I. I was his assistant when he was first appointed pathologist of the University Hospitals in 1920. We then went together as director and assistant director, respectively, of the Student Health Service and thence to the newly organized Department of Preventive Medicine and Public Health. Since I left Minnesota, our paths have crossed many times on various committee and organizational assignments, notably, in and out of Washington. I did this work for and with Harold Diehl because I liked to. One never felt that he was working for Dr. Diehl but rather with him, and I have often pondered why this was so. He has an administrative genius which is as effective as it is difficult to analyze. Like myself, I suspect that many of his faculty members at Minnesota were totally unaware of the quiet and effective manner in which he guided us and in which he fulfilled the primary function of an administrator, that is, to set up a work environment for each of us which would develop our maximum capacities. Few realize how hard and persistently he worked toward this objective. The amazing growth and present eminence of the Medical School is a testimonial to this genius.

For one thing, Harold Diehl always knew what he was talking about when addressing himself to an administrative problem. You might be certain that he had given it many hours of thoughtful study and analysis, and, to do this, he frequently burned the midnight oil. I have seen him do the same thing in his committee work in Washington so that almost imperceptibly but automatically he became the best informed member of the committee on a problem to which he addressed himself. Having reached a conclusion as to the best course of action, he had an uncanny ability to discern the right people to lead in the solution of the problem. He has never been anything but kindly, presenting his arguments calmly and in natural sequence and upholding the worthy objective which he sought so that clashes in personality and even in political belief melted away in the interest of attaining that objective. Lastly, I never knew Harold Diehl to criticize anyone. That is perhaps the main reason we all like to work with and for him.

W. P. SHEPARD

Metropolitan Life Insurance Company

As Harold Diehl's brother-in-law, I prefer to devote my few lines to some personal comments as to his genius in another direction—namely, in selecting members of his family. He chose for his father a delightful, cultured gentleman of the cloth, a Lutheran minister, who for many years was in charge simultaneously of three churches in the rural part of western Maryland. He received no salary worth mentioning, but, in spite of that, all four of his children had a rich life and all graduated from college. The Reverend William Kleinfelter Diehl came from a Pennsylvania Dutch family which received its land grant directly from William Penn.

Harold showed equally good judgment in the selection of his mother, a brilliant woman of Scotch-Irish descent, from a distinguished family of educators from Gettysburg, Pennsylvania. Mrs. Diehl, sometimes affectionately referred to by her children as "Mrs. Preacher" was the organist for the three churches.

He deserves additional credit for having selected two fine younger brothers. One of them, Norman, is a purchasing agent for the DuPont Company in Wilmington, Delaware, and the other, William, is an educator assisting in supervising the school system in Washington County, Maryland.

Still more to his credit, he arranged to have the youngest of the four children be a girl, Anna, who is a graduate of the University of Minnesota School of Nursing and makes an admirable wife and mother.

Those of us here in New York City have difficulty in feeling too sorry for the Minnesotans who have lost Harold and Julia because we are so pleased to have them join the host of Minnesota immigrants in this metropolis. New York is the richer for this transfer.

JAMES E. PERKINS, Managing Director
National Tuberculosis Association

Having been associated with Dr. Diehl since about 1922, I have come to know and respect him for many reasons. As an employer, he treated one like an associate, and, also, as an employer, he treated one as a good friend.

Julia and Harold were interested in me personally and in my family. They watched our progress from the time of our marriage, the birth of the children, the children's education and marriage, and the onset of quite a few grandchildren.

I would like to say that some of his greatest assets were his ability to judge professional capacity and relate that to the personality. These were important in building up a smooth working medical school. Friction in the staff of the University of Minnesota Medical School was at a minimum.

Due to his sense of values, he built a balance among the departments, keeping in mind his responsibility to the undergraduate and the necessity for training physicians for practice in Minnesota as well as preparing physicians for the specialties.

He had a great interest in the paramedical field. Through his effort, courses in Physical Therapy, Occupational Therapy, Practical Nursing, X-Ray Technic, and the like were established. There is no measuring how great an influence this has been on hospital and medical care in the state.

Among his attributes are his patience and his judgment in letting time solve problems that harass people. In many instances which I can think of, some reactions would not have been nearly as productive as letting time solve the problem.

Certainly, as a man and a friend, his leaving Minnesota has left a big hole in my heart.

RAY AXBERG, Director

University of Minnesota Hospitals

To few men has it been given to accomplish so much in the field of education in the medical sciences as was achieved by Harold Diehl during his service as dean. Coming to his task with a background of outstanding accomplishment in the development of the Student Health Service, he guided the expansion and growth of the College of Medical Sciences in a manner that earned for him well deserved local, national, and international recognition and respect. With a clear understanding of the needs and ideals of medical education at both undergraduate and graduate levels, he strengthened that which was old and helped to pioneer that which was new. A deep appreciation for public health found expression in the creation of a school of public health with a broad program of professional and lay education intimately allied with other facets of education in the health sciences. His recognition of the importance of ancillary services in over-all medical care was expressed through the support he has given to the strengthening and development of these fields. Above all, Harold Diehl has been far more than a respected leader. As we who have

worked most closely with him reflect upon our associations, we appreciate the loyal support, the understanding guidance, and the sympathetic friendship that have earned for him such a host of devoted and loyal friends in all fields that have felt the warmth of his personal touch.

GAYLORD W. ANDERSON, M.D.
Director, School of Public Health,
University of Minnesota

Probably no one on the faculty of the School of Medicine to which Dr. Diehl has devoted his professional life has known him as long or is more appreciative of and takes greater pride in his accomplishments than I. When he entered the School of Medicine in 1914, I was instructor and taught his section in anatomy. His sincerity, truthfulness, honesty, forthrightness, and fine scholarship were constantly impressed upon me throughout that school year. When he became director of the Student Health Service seven years later and during the next fourteen years, he supported my chest clinic to the greatest degree. As chief of the Department of Preventive Medicine and Public Health in 1923, he nominated me for a position in his department for the teaching of public health and epidemiologic aspects of diseases of the chest with particular reference to tuberculosis. All through the years that he continued to head that department and direct the Student Health Service, he was an ideal chief, always encouraging and supporting teaching and research. This continued in the same steadfast manner after he became dean of Medical Sciences in 1935 and has been abiding.

Early in the forty-four years of our close association, one of the main reasons for Dr. Diehl's superb success as an administrator unfolded. When he was a student of anatomy, he never presented dissection demonstrations until he had worked out every detail

and had the subject well in hand. When he directed the large staff of the Student Health Service; the teaching of faculty members of a department in the School of Medicine; and, finally, the Medical Sciences, when the Medical School alone had more than 600 faculty members; and, at the same time, directed a huge building program and participated in committee meetings in Washington and elsewhere two dozen or more times a year, many trying and difficult problems were before him for final solution. All through life, the traits that probably stood him in best stead were those which were so well in evidence when he was a student of anatomy; namely, calmness and an ability to assemble all facts, analyze them carefully, and arrive at correct and just decisions. In controversies between staff members and the like, he exhibited almost unbelievable patience. When serious situations confronted him, he often said, "Patience and time solve many problems."

Speaking for the faculty of the School of Medicine, Dr. E. T. Bell said, "He has welded us together as a friendly cooperative group. It is a joy to all of us to congratulate him on his long, successful career."

In 1957, Dr. Diehl accepted the positions of senior vice-president for Research and Medical Affairs and deputy executive vice-president of the American Cancer Society. A spokesman of the Cancer Society said, "We are extremely fortunate in obtaining Dr. Diehl's great talent and rich experience." Thus, he continues to serve in an important health field.

When it was announced that Dr. Diehl was leaving, the faculties of the College of Medical Sciences were unanimous in the statement of President J. L. Morrill, "The University must regard his ultimate departure with deepest regret, yet with heartiest congratulations and pride."

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Carroll E. Palmer

Merits World-Wide Recognition

J. ARTHUR MYERS, M.D.

Minneapolis, Minnesota

PHYSICIANS AND THEIR ALLIES of the Upper Midwest take particular pride in the high honor recently bestowed upon Dr. Carroll E. Palmer by the Royal College of Physicians in London, England.

Dr. Palmer was born at Fairmont, Minnesota, in 1903. He received the degree of Bachelor of Science from Hamline University, St. Paul, in 1925; Master of Arts in 1927, Doctor of Medicine in 1928, and Doctor of Philosophy in 1929 from the University of Minnesota. He was associate in biostatistics at Johns Hopkins School of Hygiene and Public Health from 1929 to 1936 and consultant in child hygiene in the United States Public Health Service from 1932 to 1936. He was statistician and supervisor of medical records at Johns Hopkins Hospital in 1935 and 1936. He was director of research in the Child Hygiene Office, United States Public Health Service from 1936 to 1942. Since that time, he has directed the research of the Tuberculosis Program of the Division of Special Health Services. He has been a medical director in the Commissioned Corps of the United States Public Health Service since July 1950. He is a diplomate of the American Board of Preventive Medicine and Public Health and is founder of and holds membership in numerous local, national, and international medical and public health organizations.

In 1945, Dr. Palmer published a medical classic in which he showed for the first time that histoplasmosis is a prevalent condition in certain parts of the United States. Prior to this study, the disease had been thought to be universally fatal. Since this initial work, the histoplasmin test has become a routine diagnostic procedure in many places and its role in the differential diagnosis of fungous infections has been greatly clarified. Since 1945, he has continued to do extensive work in histoplasmosis and other fungous diseases and has made valuable contributions to knowledge in that field.

Among other researches in this country, Dr. Palmer has directed a ten-year study of tuberculosis in student nurses and 4 trials of BCG vaccination in (1) children in Puerto Rico, (2) American Indian children, (3) inmates of institutions for the mentally ill, and (4) a general population in Muscogee County, Georgia, and Russell County, Alabama. More recent work under his direction includes cooperative therapeutic trials of the use of the newer antituberculosis drugs and extensive studies on the prophylactic use of isoniazid in tuberculosis control.



CARROLL E. PALMER

From 1949 to 1955, Dr. Palmer served, in addition to his duties for the Public Health Service, as chief of the Tuberculosis Research Office of the World Health Organization, with headquarters in Copenhagen, Denmark. During that time, he organized a field research program which demonstrated that precise, scientific epidemiologic research can be done on a world-wide basis. Results of the work of the Tuberculosis Research Office have served as a guide to the practical tuberculosis work of WHO and have greatly influenced local tuberculosis services in many parts of the world.

All of this and more has afforded Dr. Palmer the best position of any world citizen to evaluate the tuberculosis control measures throughout the world over the past ten years and to emphasize the procedures necessary to eradicate the disease (see his paper in the June issue of THE JOURNAL-LANCET).

Dr. Palmer was the second American physician to receive the Weber-Parkes Prize in London, Dr. Eugene Opie being the first in 1945. This award is bestowed only once each three years and was given Dr. Palmer for his contribution in interpreting tuberculin sensitivity and his work in tuberculosis immunization. He is the author of more than 100 articles published in medical and public health journals and has work in progress which promises many more excellent contributions to knowledge.



This department of THE JOURNAL-LANCET is devoted to reports on cases in which all the appropriate diagnostic criteria have been employed, the best known treatment administered and the results recorded. It is desired that these case reports be so prepared that they may be read with profit by physicians in general practice, hospital residents and interns and may be of considerable value to junior and senior students of medicine. This department welcomes such reports from individuals or groups of physicians who have suitable cases which they desire to present.

Female Pseudohermaphroditism

A Case Report

JOHN F. BRIGGS, M.D., and
JAMES BELLOMO, M.D.

St. Paul, Minnesota

ON MARCH 22, 1936, J. M. was born at Ancker Hospital, St. Paul. Her mother's pregnancy was normal. The delivery was normal. A physical examination at the time of discharge from the hospital revealed a normal white female infant. Except for an attack of bronchial pneumonia in August 1938, no untoward events were noticed in the child's development. In October of 1939, the mother reported that she was insecure about the child's sex. She had noticed that the external genitalia had now changed in appearance and that they did not "look" like a girl's "genitalia." The patient was readmitted to the hospital on October 2, 1939. The physical examination at this time was normal except for the genitalia. The examination of the pelvis revealed no masses in the abdomen nor were any masses present in the groin, the perineum, or the labia. The clitoris was enlarged and resembled a penis. At the base of the clitoris was an opening near its surface which led into what appeared to be a vaginal sac. The labia had the appearance of a scrotum; on separation of the labia, the skin between covered the vaginal entrance. The urethra led back into this pouch. No urethra could be found in the clitoris.

On October 18, 1939, bismuth paste was injected into the external urinary meatus. This re-

vealed a long tract corresponding to the urethra, but it also connected with the vagina. The vaginal chamber appeared normal. The urethral canal extended anteriorly and superiorly to the vagina and entered the bladder space. The intravenous urogram showed that the bladder was normal in size, lying superiorly and anteriorly to the vagina, and the dye outlined the urethra in the canal to the vagina. On October 24, 1939, a laparotomy was performed. The uterus was found to be extremely small and felt like a ridge at the junction of the tubes with the uterus. The tubes themselves seemed normal in size. The uterus resembled a fibrous cord. No fundus was visible, and it had the appearance of a bicornate uterus. The gonads were in normal position and relationship to the fimbriated end of the tubes. A biopsy from the medial portion of each gonad was taken. There were no abnormalities in the pelvis. The biopsy revealed normal ovarian tissue. Since the sex of the patient was definitely established, on November 4, 1939, a director was inserted into the urogenital sinus. Using this as a guide, the urogenital sinus was opened and the incision carried posteriorly until the urethra and vagina were completely exposed. The mucous membrane was then sutured to the skin, and a temporary pack was left in the vagina. Dilatation of the vagina was carried out periodically by the mother. There was no evidence of breast development, very scanty growth of pubic hair, and a mild degree of hirsutism.

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had appeared. On July 2, 1944, the patient entered St. Joseph's Hospital for further study. At this time, air injections of the perirenal areas were normal. The glucose tolerance test and blood cholesterol tests were normal. On August 12, 1944, the clitoris, which had now developed into a structure comparable to the male penis of the corresponding age, was amputated. At 9 years of age, the patient had a very definite beard and axillary hair. Pubic hair was now present. At 10 years of age, breast development appeared for the first time in the areola and the nipple became enlarged, but there was no evidence of breast tissue itself. On May 13, 1954, the patient entered St. Joseph's Hospital for further study. At this time, she was 60 in. tall, weighed 101 lb., and the physical examination was completely normal with the following exceptions: (1) the presence of a facial beard, (2) male type of pubic hair, (3) very little axillary hair, (4) complete absence of any breast tissue, and (5) no sign of ovulation. At this time, the laboratory examinations all were normal, and the 17-ketosteroid test was normal. A mass was felt in the abdomen which suggested an ovarian cyst. On June 11, 1954, an abdominal laparotomy was performed, and the left tube and ovary were removed. The ovary was cystic, and the histologic diagnosis was serous, papillary cystadenoma of the left ovary. The tube was normal, and the appendix was removed routinely. On exploration of the abdomen, the right tube and ovary were found to be normal, and the uterus appeared normal in size, shape, and position.

On September 3, 1954, a sufficient amount of Hydrocortone was obtained to treat the patient. Under steroid treatment starting on September 3, 1954, the size of the patient's breasts began to increase and became painful and swollen. The hirsutism disappeared, and the patient began to have very definite spotting. By February of 1955, she had been having a one-day monthly period. The Hydrocortone was decreased gradually and finally discontinued entirely. With ces-

sation of the Hydrocortone, the monthly spotting continued. At times, the flow lasted four days, and, at other times, merely spotting or a one-day discharge occurred.

On April 22, 1955, her breasts were large, her face was now hairless, and she looked like a girl. The vagina was essentially normal in size following the repeated dilatation, and the clitoris, which had been partially amputated, was now about the size of a normal clitoris.

The patient married. In February of 1957, she had a spotting period, and then, on April 2, 1957, reported that she had missed her March period completely. Examination revealed that the breasts were large, firm, and painful and that the uterus seemed enlarged to the size of a six weeks' pregnancy. There was no further growth in uterine size. A frog test was negative, and a rabbit test was negative. On April 23, 1957, the same physical findings were present. On April 30, 1957, the patient reported that she had had a very heavy flow of blood lasting six days. This was unusual in that the amount of flow was more than usual, and clots were present. The examination now revealed that the breasts had returned to normal size and that the uterus, which was normal in size, could be palpated. It was our feeling that the patient had become pregnant and that when seen by us she was suffering from a missed abortion. She is perfectly well and is still menstruating.

CONCLUSION

A case is reported of a female pseudohermaphrodite who has been studied since birth. Reconstruction of the vagina has resulted in a normal vaginal passage. The use of steroids has obliterated the hirsutism and brought about a normal menstrual period, and we believe that she was pregnant in February 1957 but aborted spontaneously. The patient is still menstruating and has the appearance of a perfectly normal woman.

Hydrocortone supplied through the courtesy of Merck & Co., Inc.

Foreword

The distress associated with dysmenorrhea may be communicated to society individually and collectively, and this subject is described in broad terms in the paper entitled, "Primary Dysmenorrhea: Current Concepts and Treatment," by Dr. Martin L. Stone and Dr. Alvin F. Goldfarb. This excellent review of the whole subject should be of general interest to all.

JOHN S. LUNDY, M.D.

Primary Dysmenorrhea: Current Concepts and Treatment

MARTIN L. STONE, M.D., and
ALVIN F. GOLDFARB, M.D.

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PRIMARY DYSMENORRHEA, that is, menstrual pain for which no concomitant organic cause can be found, presents a real challenge to the conscientious physician. It is fairly widespread, having been estimated to occur in about 35 per cent of menstruating women.¹ This same incidence has been noted in surveys of high school and college girls.² The disorder causes considerable interference with normal routines in many cases. For example, 20 per cent of a group of 392 high school girls were reported to have missed classes 1 or more times during the academic year because of dysmenorrhea, and 5 per cent missed school 4 to 8 times. The economic loss to the individual and to industry is said to be 3 times as great as from the common cold.³

Although dysmenorrhea has been recognized and treated since the dawn of medical history,³ the cause in most cases remains obscure. The varying responses to treatment in different individuals, and the observation that many unrelated types of therapy produce good results in a significant percentage of cases, lead one to believe that different mechanisms may be at work in different individuals.

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PSYCHIC FACTORS

The psychic element has been given an enormous amount of emphasis by those interested in this aspect of the subject. Among the psychologic factors which have been suggested are lack of proper preparation for menstruation; "old wives' tales;" sexual taboos; improper attitudes on the part of the mother, such as oversolicitousness and considering the menstrual period as a time to be unwell; unwillingness to face adult life; and the beginning of social relationships with boys. The psychic element must not be overlooked, especially since a failure of adaptation of this magnitude in adolescence often augurs similar failures in the adjustments of adult life — as in marriage, pregnancy, and child-rearing. If the young person is helped early with understanding and positive guidance, these maladjustments arising later in life may often be prevented.

On the other hand, the importance of avoiding undue emphasis on the psychosomatic aspects of dysmenorrhea is shown in an interesting study by Schuck.⁴ He compared the health records of 300 dysmenorrheic students with 300 whose menstrual periods were "normal." There was no more indication of psychoneurosis, that is, the characteristic multiplicity of complaints, in the former than in the latter. In fact, more than 60 per cent of the students in the affected group listed menstrual pain as the *only* disturbance.

POSSIBLE PHYSIOLOGIC CAUSES

In a small percentage of cases of dysmenorrhea, an organic cause is found on careful examination, such as endometriosis, dermoid cyst, or pelvic inflammation. The dysmenorrhea in such cases is designated as "secondary" and will not be considered here.

Various alterations in physiologic balances have been proposed by workers in the field. Schuck¹ attempted to establish a state of increased *autonomic spasticity* as a cause in his cases, thinking that a "vagotonic" constitution might play a role. He was unable to correlate the dysmenorrheic condition with other manifestations of parasympathetic overactivity, such as history of gastrointestinal disturbances, asthma, hay fever, and nervousness. Conversely, "vagotonic" patients did not have an unusual incidence of dysmenorrhea. Medications, such as atropine or belladonna, which have a specific effect on parasympathetic spasms were found to have no beneficial effect on menstrual pain. In addition, the theory that the cramps are reactions to *mechanical obstruction* that must be overcome by painful muscular contractions had to be discarded because no correlation could be shown between the onset of pain and of free menstrual flowing. Thus, pain might occur hours or days before, concomitantly with, or several hours after the onset of flow.

A factor which does fit the above timetable of the onset of pain, however, is the *vasoconstriction* or *angiospasm* of the endometrial arteries, which starts from five to twenty-four hours before the bleeding, continues during the establishment of flow, and is later characterized by alternating vasoconstriction and vasodilation. Vasodilators were found to have a variable effect on pain, producing good relief in some cases and none in others. The good effect of estrogen in a high percentage of cases is postulated as being due to a vasodilating factor contained in or activated by the estrogenic hormone.⁴

The theory of arterial vasoconstriction is also put forth by Parsons³ in his discussion of the possible mechanism of dysmenorrhea. He mentions the vasoconstricting effect of progesterone as opposed to the vasodilating effect of estrogen. The relative lack of progesterone in anovulatory cycles may help to explain the painlessness of these periods. A combination of factors, such as increased uterine tonicity in the presence of uterine ischemia, may serve to explain the lack of response to therapy directed at a single cause.

Some other factors which have been consid-

ered important in the past but which are now believed to be operative in only occasional cases are: narrowing of the cervix, underdevelopment of the uterus, and the action of a menotoxin as postulated by Smith and Smith. Since the latter believe that this substance is produced by all menstruating women in the catabolic stage of the cycle,⁵ it is difficult to explain the occurrence of dysmenorrhea in only a minority.

TREATMENT

Treatment of dysmenorrhea should be preceded by a thorough physical examination and detailed history. A vaginal examination is not necessary or even desirable in young girls; a rectal examination should suffice. The history should include an inquiry into the patient's attitude toward menstruation and her degree of knowledge about this function and the process of maturing. On the basis of these data, the physician should supply any additional information or correct any misinformation that seems indicated. Often a sympathetic attitude toward the young person's story and a little encouragement and advice do a great deal to improve the condition in mild cases. Proper diet, regular hours, and general hygiene should be stressed. A.P.C., Edrisal, and other standard analgesic preparations are widely recommended in this type of case. Stretching exercises, as described by several workers,⁶⁻⁸ have brought relief in a high percentage of cases after two or three months. Crossen⁷ has described and illustrated the technic for performing these exercises.

Hormone therapy. In more severe cases, not adequately helped by the preceding measures, a more specific plan of therapy is needed. Usually, this means administration of one or another of the hormones. Progesterone has had a certain popularity in the past on the theory that it has a quieting effect on the uterus, but results have not, on the whole, been sufficiently encouraging to warrant its continued use.^{3,4} Testosterone, given in the first half of the cycle, has been attended by some success; most investigators believe this to be due to suppression of ovulation. A dose large enough to suppress ovulation is also apt to cause masculinizing phenomena, and, thus, the risk seems to outweigh the advantages. Thyroid extract is often beneficial where specifically indicated, most often in patients living in areas of endemic hypothyroidism.

Estrogen seems to be the hormone of choice in the therapy of severe dysmenorrhea.³ Schuck,¹

however, found it ineffective in 40 per cent of cases. Although the efficacy of estrogen has been attributed to suppression of ovulation, Schuck found that it exerted the anticipated beneficial effect in many cases in which it was demonstrated that *ovulation had occurred* in spite of the therapy.

Various forms of estrogen may be used. Beginning on the first day of the cycle or as soon as oral medication can be tolerated, 1 mg. of diethylstilbestrol, 0.05 mg. of ethinyl estradiol, or 1.25 mg. of a conjugated estrogen preparation, such as Premarin, is given. Daily doses are given at bedtime for twenty days and then discontinued. Painless withdrawal bleeding should begin about six days after discontinuation. Therapy is resumed with the onset of bleeding and the regimen repeated for three months, after which all therapy is withdrawn to allow the patient to ovulate normally and to assess the degree of permanent relief. Another very successful regimen is 5 mg. of diethylstilbestrol taken for six nights before the estimated time of ovulation.⁹ In spite of the beneficial results, ovulation is not always suppressed. If no relief occurs in the first period after therapy is initiated, subsequent courses will usually be ineffective also.

The combined use of estrogen and testosterone in the preovulatory phase has recently been used with excellent results.⁹ A tablet containing conjugated estrogens, 1.25 mg. of Premarin, and 10 mg. of methyltestosterone is given three times daily from the seventh to the fourteenth days of the cycle. This usually produces a painless cycle the first month, and, after two painless cycles, dosage can be reduced until an optimum dose is obtained. The side effects of either hormone are greatly reduced by the combined therapy.

Heald and associates¹⁰ prefer not to use extensive estrogen therapy in adolescents for fear of disturbing the adjustment of hormonal patterns at this time. However, it may be valuable to use one course to produce a pain-free period, which will indicate the absence of organic pathology, demonstrate to a skeptical patient the physiologic nature of her ailment, and encourage confidence in the physician.¹⁰

Antispasmodics. Amphetamine, which apparently has a uterine spasmolytic effect as well as mood-elevating action, is often prescribed with analgesics in dysmenorrhea. Atropine, belladonna, and phenobarbital have been advocated,³ but Schuck's opinion that the atropine-like drugs seldom are beneficial has been noted. They may relieve colicky pains in some cases, but backache

and bearing-down pains are seldom helped. In spite of the fact that recent opinion seems to minimize the role of uterine spasm in dysmenorrhea, reports of success with some of the newer or even certain older antispasmodics continue to appear. This seems to substantiate the idea that a combination of vasoconstriction and uterine spasm is at work in many cases of menstrual pain.

For example, Jones¹¹ has reported good results with the use of a new drug, lututrin, derived from the corpus luteum of sows' ovaries and standardized for potency in terms of units of activity on the guinea pig uterus. It has been found to have a potent relaxant effect on uterine contractions, even stopping those produced by Pituitrin. In 40 cases of dysmenorrhea, Jones obtained better results than he had previously had with any other type of treatment. Complete symptomatic relief occurred in 57.5 per cent, and cramps were sufficiently improved in 30 per cent to enable the patients to go about their duties.

Malkin¹² treated dysmenorrhea with methantheline (Banthine), a quaternary ammonium compound known to be useful in alleviating visceral spasms in peptic ulcer, biliary colic, ureteral spasm, and so forth. Though the series of patients was small, results were encouraging in that gastrointestinal symptoms disappeared, uterine pain was well controlled or disappeared entirely, and abdominal bloating decreased. Dosage was 25 to 50 mg. orally three times a day after meals, starting two or three days before the expected onset of menses and continuing through the first day of flow. Malkin believes that methantheline may promote vasodilatation through its sympathetic blocking effect as well as relax the uterine musculature and diminish uterine contractions through its parasympathetic blocking effect. "Hence the integrated effect would be a smaller contraction in the presence of an increased vascular supply and therefore less pain."

Magnesium gluconate, a newer magnesium preparation said to be better tolerated than the older forms, has been used in eclampsia and dysmenorrhea for its known depressant and antispasmodic actions on neuromuscular functions. It has been found to have a powerful spasmolytic action on the tetanized pig uterus. Rawlings¹³ used an aqueous magnesium gluconate solution (1.3 gm. in ½ oz. of water) orally for seven days, beginning four days before the menses and continuing for the first three days of the period. For premenstrual pain, treatment

was started seven days before menses and continued through the first day. Of 15 women complaining of premenstrual pain, 5 were relieved and continued pain-free for a six- to twelve-month follow-up period; 8 obtained relief, but relapsed when therapy was discontinued; and 2 failed to respond. Of 18 women with menstrual pain, 5 appeared cured, 11 obtained temporary relief, and 2 failed to respond. Little corroborative evidence of the usefulness of this therapy has appeared.

Vasodilators. Long before uterine ischemia with arteriolar vasoconstriction was postulated as one of the causes of dysmenorrhea, alcohol, known as a vasodilator, was used empirically by physician and layman alike to alleviate cramps and backache. Caffeine, an ingredient of many proprietary preparations, may also aid relief through its vasodilating action. Aminophylline has produced good results in one study,¹⁴ though its effect was attributed to its spasmolytic action on uterine muscle rather than to vasodilatation. Recently, various drugs with specific and potent vasodilating effects have been tried in dysmenorrhea with varying degrees of success.

Butler and McKnight¹⁵ carried out careful trials with vitamin E because of its well-known beneficial effect on vasospasm, for example, in Buerger's disease. The study included 100 students with dysmenorrhea who were otherwise in good health and seemed to have no psychologic difficulties. Of these, 50 received vitamin E tablets (50 mg.) three times a day, and 50 received placebos. These were given out by the students' supervisor ten days before the period was due. The tablets and placebo were given in strict rotation, and the investigators did not know which girls received the vitamin E. In general, results were considered sufficiently encouraging to warrant further clinical trials: for example, of 28 girls who were incapacitated during the menses before therapy, 7 were symptom-free at the second month after therapy, 8 had only discomfort, 7 had slight pain but were not incapacitated, and 6 showed no change. In the over-all picture, 34 of the 50 treated, 68 per cent, showed some improvement compared with 9 of 50 controls, 18 per cent. Parsons³ has also advocated vitamin E in dysmenorrhea for its effect on the vascular bed.

Another vitamin with vasodilating properties, niacin, has been reported to produce excellent relief of dysmenorrhea in 90 per cent of cases, especially when given in conjunction with rutin and ascorbic acid.¹⁶ These vitamins are believed

to potentiate the vasodilating effect of niacin through their ability to decrease capillary permeability. The therapy is considered partly pharmacodynamic (vasodilating action) and partly nutritional, inasmuch as the improvement often lasts for several months after treatment is discontinued. The preparation used contained 100 mg. niacin, 60 mg. rutin, and 300 mg. ascorbic acid. It was given night and morning for at least seven to ten days before the onset of flow and every two to three hours during the usual period of pain.

Schuck⁴ experimented with Padutin, a vasodilative, insulin-free hormone from the pancreatic gland, in a series of 80 cases. The drug caused no side effects and produced fair to good pain relief in about 50 per cent of patients. Over-all results were not as good as those produced with estrogenic hormones. He notes that Priscoline, a far stronger synthetic vasodilator, has been used by others with correspondingly better results, but uncomfortable and even severe side effects are common.

Antihistamine preparations. Antiallergic therapy, consisting of antihistaminic drugs or epinephrine, has been used with some success in dysmenorrhea. Whether this success is due to correction of some allergic factor in a given case or to an antispasmodic effect of the antihistamines is not known. Macpherson¹⁷ attributes his spectacular success with epinephrine in one very severe case and his subsequent good results with this drug or an antihistamine in other cases to correction of a "pelvic allergy" in which the pelvis presents much the same condition as the chest in asthma. Maietta¹⁸ used an antihistamine preparation with good results in 20 patients with severe dysmenorrhea, all but 1 of whom had a personal, and, in some cases, a family history of allergy, such as asthma, hay fever, or eczema. All of the patients experienced excellent control of symptoms; placebos given in place of the antihistaminic were strikingly ineffective.

Miscellaneous drugs. Rauwolfia has been tried in dysmenorrhea with little or no benefit.³ Chlorpromazine, alone or in combination with Edrisal, has produced excellent results in severe cases which had not responded to bed rest and analgesic or sedative therapy.¹⁹ The drug was first compared with A.P.C. and a placebo in a double-blind study involving 48 patients. All three medications were effective, but chlorpromazine was the most effective in patients with nausea, vomiting, and a great deal of tension and anxiety accompanying the dysmenorrhea. In a second

part of the study, chlorpromazine plus Edrisal and codeine sulfate plus Edrisal were compared. The proportion of good responses was almost identical. Thus, in dysmenorrhea severe enough to give rise to vomiting or to require narcotics, chlorpromazine appears to be a useful adjunct to other medications and a substitute for codeine.

Two proteolytic enzymes, papain and bromelain, the former produced from green papaya fruit and the latter from juice of the stems of mature pineapple plants, have very recently shown some promise in dysmenorrhea.²⁰ While being tested for their efficacy as contrast media in hystero-graphy, it was noted that in addition to their mucolytic effect, which clears the passages and facilitates better roentgenograms, these substances greatly relaxed and dilated the cervical canal. It was decided to try these enzymes in primary dysmenorrhea. Various solutions were injected directly into the uterus when painful cramps began and were retained for five minutes. Of 64 patients treated in this manner, 40 experienced immediate relief which was maintained for the duration of the flow and sometimes for more than one period. Those who failed to respond were later found to have secondary dysmenorrhea. Thus, the procedure was not only therapeutic but diagnostic. Though this may be a valid procedure in some cases in which other methods short of surgery have failed, the inconvenience and the likelihood of embarrassing the average patient would not commend it for routine use. The procedure also would not be suitable for adolescents.

Surgical procedures. It is generally agreed that all forms of therapy should be tried in incapacitating dysmenorrhea before resorting to major surgery, such as presacral neurectomy. A minor surgical procedure, which may be carried out in severe cases, is dilatation of the cervix and curettage.^{3,10} The reason for its beneficial effect in some cases is not clear. Benefit has been attributed to the damaging of nerve endings in the plexus around the external os by forceful dilatation of the cervix. It may be that the curettage, which removes all the endometrium and provides a clean base for the hormones to act on, is the more important factor. Be that as it may, satisfactory results are obtained in about 50 per cent of cases.³ Heald and associates¹⁰ state that the improvement is seldom permanent, however.

Presacral neurectomy should be performed only in patients in whom menstrual pain is of

uterine origin; ovarian dysmenorrhea does not respond.^{3,21} In addition, this procedure will be successful only in patients in whom suppression of ovulation by hormone therapy has been shown to produce a pain-free period. If pain is not relieved and it can be demonstrated that ovulation has actually been suppressed, the patient either has unrecognized pelvic disease or is a candidate for psychotherapy.³ After careful screening, between 5 and 10 per cent of patients with dysmenorrhea will be suitable subjects for presacral neurectomy. Black²¹ performed the operation in 70 cases of primary and acquired dysmenorrhea and reported a long-term follow-up in 61 of these patients. Complete relief was obtained in 62 per cent of 45 primary cases and partial relief in 29 per cent; complete relief occurred in 75 per cent of 16 acquired cases and partial relief in 19 per cent. Most of those partially relieved felt that the operation was worthwhile. Black describes the technic in some detail.

Doyle²² calls attention to the limitations of presacral neurectomy, which include the facts that the usual percentage of success is only 60 to 70 per cent, backache or dull pelvic aching is seldom helped, ovarian dysmenorrhea is not responsive, and menometrorrhagia is usually aggravated. He presents the procedure of transection of the cervical plexus as a more physiologic and successful technic. He found it particularly valuable in patients with acquired dysmenorrhea who are often not helped by presacral neurectomy. Relief of this type of dysmenorrhea occurred in 94.5 per cent of his patients, and 86.3 per cent were *completely* relieved. This is higher than the percentage of success usually attributed to presacral neurectomy. Associated menometrorrhagia was relieved. Symptoms did not tend to recur as sometimes happens after the other operation. The technic is described and illustrated.

SUMMARY

Current concepts of the pathogenesis and treatment of primary dysmenorrhea have been reviewed. The treatment of this condition is extremely complex because of the difficulty of ascertaining a clear-cut cause for the syndrome in most cases. However, a high percentage of patients may be helped by one or a combination of methods reviewed here if the individual patient's total personality and physical make-up are considered and every clue is followed which may aid in linking the dysmenorrhea to some characteristic physiologic pattern. For example,

the allergic patient's dysmenorrhea may have an allergic basis . . . the underdeveloped patient's trouble may be of endocrine origin . . . the "vagotonic" type may be relieved by anti-

spasmodics . . . and so on. With such an approach, it should be unnecessary for these unfortunate persons to go from physician to physician seeking help.

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Book Reviews on Pain

NERVES EXPLAINED: A STRAIGHTFORWARD GUIDE TO NERVOUS ILLNESSES, by RICHARD ASHER, M.D., F.R.C.P., physician, The Central Middlesex Hospital, 1958. Springfield, Illinois: Charles C Thomas, 157 pages. \$2.75.

The author of this small book is a British general practitioner who says he does not believe there should be "any clear division between physician and psychiatrist." Quoting Terence, he presents this motto: "As a man I am concerned with everything to do with mankind."

This book was written to afford the author an opportunity to present his convictions about the nervous system. The plan of the book is to consider the various nervous illnesses according to the terms commonly used for them, and the chapters are arranged systematically on such a basis. He has explained what each condition is and what he thinks can be done about each one, and he has used a form of writing which the ordinary reader can readily understand.

The book is easily read. It is indexed. It presents a very rational point of view in conveying by means of words the mental picture the author has before him

when he is dealing with a form of nervousness or nervous illness.

JOHN S. LUNDY, M.D.

SPINAL ANESTHESIA, by JOHN B. DILLON, M.D., professor of surgery and chief of the Division of Anesthesia, Department of Surgery, University of California Medical Center, Los Angeles, 1957. Springfield, Illinois: Charles C Thomas, 61 pages. \$3.00.

In the preface the author says, "This monograph is written in the hope that it will assist the physician who performs spinal anesthesia, but who has had neither the time nor the opportunity to explore some of its facets. It is hoped that it will be a stimulus to residents in Anesthesiology by causing them to look further into many phases of spinal anesthesia about which there is still much to learn."

"The point of view taken on techniques and dosages is conservative but known to work within the limits prescribed."

This he should accomplish.

JOHN S. LUNDY, M.D.

Current Literature on Pain

THE EFFECT OF NISENTIL (ALPHAPRODINE) HYDROCHLORIDE AND LORFAN T.M. (LEVALLORPHAN) TARTRATE ON RESPIRATION, by JACK AUERBACH and C. S. COAKLEY: *Anesth. & Analg.* 45:460-467, 1956.

"It appeared logical that the combined use of alphaprodine with levallorphan might be advantageous in the management of labor in that it would permit the administration of more liberal doses of the narcotic, with correspondingly more complete analgesia, without any untoward effect on respiratory function of mother or infant. Since alphaprodine is usually given subcutaneously to patients in labor, it seemed advisable, before embarking on a study of this drug in obstetrics, to investigate its effects by this route in combination with levallorphan at varying dosage ratios and in other conditions

"A study was made of 69 cases in which the patients' ages ranged from 15 to 67 years The 69 patients were divided into two groups: 27 received alphaprodine alone and 42 were given alphaprodine in combination with levallorphan

"Respiratory rates and minute volumes were determined for all 69 subjects initially and 15, 30, 45 and 60 minutes after administration of the drug. Alphaprodine alone decreased the respiratory rate insignificantly and reduced the respiratory minute volume to 78.4 per cent of the control value (fifteen minutes after the administration of the drug). The addition of levallorphan to alphaprodine increased the respiratory rates to control values or above at almost all readings.

"The use of one part or more of levallorphan with 20 parts of alphaprodine gave maximal reversal of depression of respiratory minute volume. The combination of alphaprodine and levallorphan in the ratio of 20:1 produced a minimum of side effects. The analgesic property of alphaprodine was not diminished by the addition of levallorphan in any of the ratios used. It is concluded that levallorphan is effective in preventing alphaprodine-induced respiratory depression when both drugs are injected subcutaneously."

From JOHN S. LUNDY and FLORENCE A. McQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 11. Copyright by JOHN S. LUNDY.

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HERNIORRAPHY IN THE POOR-RISK PATIENT, by P. H. BEVES and C. H. J. REY: *Anesthesia* 11:311-318, 1956.

"This is a report on 22 cases of repair of herniae in patients who were considered poor operative risks, to show that satisfactory operating conditions can be provided by the use of the 'lytic cocktail'—chlorpromazine, promethazine and pethidine in various proportions—and local analgesia The eldest patient was 86 and the youngest 56

"Fifty milligrams of each drug are drawn up into a 20 ml. syringe and diluted to 20 ml. with normal saline. Extra pethidine (and rarely chlorpromazine also) is given separately if it seems desirable as the operation proceeds. Five patients received 50 mg. of each drug. Six patients received 50 mg. of chlorpromazine, 50 mg. of promethazine, and 100 mg. of pethidine. The other 11 received total doses of chlorpromazine varying from 25 to 75 mg.; of promethazine varying from 20 to 50 mg.; and of pethidine varying from 30 to 150 mg. . . . A Ryle's tube is passed and aspirated pre-operatively only in those patients who give a history of copious or foul vomiting, or where there is any doubt about the reliability of the patient's story. Strong cortical depressants such as morphine are absolutely contraindicated

"The 'cocktail' is administered intravenously after dilution; it is given slowly, four minutes being taken for the injection. The patient is immediately transferred to the operating table and reassured; the legs and thighs are lightly strapped down and the hands held on the patient's chest by a nurse. After painting the skin with tincture of iodine and towelling up, the infiltration is commenced (about five minutes after the intravenous injection has been completed). A slight movement of the patient is often noticed as the needle is inserted. Procaine hydrochloride (0.5 per cent) without adrenaline is employed and is injected with a 5 in. (12.7 cm.) needle through one puncture wound only. Infiltration is limited to a subcutaneous area just beyond the limits of the proposed skin incision, together with an injection into the muscular planes 1 in. (2.5 cm.) medial to the anterior superior iliac spine with the intention of blocking the ilioinguinal nerve. The average volume used is 70 ml. (2 oz.). We have found further infiltration of the muscular planes and peritoneum unnecessary. Presumably such deep structures as are encountered are rendered sufficiently insensitive by the 'cocktail.' Chlorpromazine is adrenolytic and is likely to inactivate any adrenaline added to the local analgesics. We have used procaine without adrenaline and had no trouble from vasodilation

"The majority of patients sleep for several hours, require no postoperative sedation, and when visited the next day often do not realize that they have had their operation. A few, especially those who have had a smaller dose of promethazine, are awake earlier and require some sedation. Pethidine in doses of 10 to 30 mg. intramuscularly is given when required. The nursing staff is warned that NO morphia, no extra blanket and no hot water bottles be given The average length of stay in the hospital was fifteen days. There were 2 deaths, neither of which was directly attributable to the operation."

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Stress and Strain in Bones, by F. GAYNOR EVANS, Ph.D., 1957. Springfield, Illinois: Charles C Thomas, 227 pages. \$6.50.

This book presents a survey on stress in long bones, the skull, and the spinal column under physiologic and pathologic conditions. Some of the more recent experimental work in this field is included and combined with the author's own studies on several special subjects.

The book begins with an explanation of the terms "stress and strain" and continues with a description of the various methods used to measure and study these conditions. The first part of the book applies more to the theoretic side of the subject, whereas the second part engages in the interesting data for clinical use, such as the effect of stress in bone healing and growth, the influence of stress in osteogenesis, the factors influencing breaking strength, and so on.

The author is aware of the fact that many of the studies were not carried out under physiologic conditions, which naturally limits the practical use of the gained knowledge.

JOHN H. MOE, M.D.

•
Human Blood Coagulation and Its Disorders, by ROSEMARY BIGGS, M.D., and R. G. MACFARLANE, M.D., ed. 2, 1957. Springfield, Illinois: Charles C Thomas, 476 pages. \$8.50.

In the rapidly advancing field of blood coagulation, frequent reviews are desirable. A textbook covering the entire subject of coagulation will be obsolete in some respects even at the date of publication, but such a book nevertheless can satisfy a great need by presenting in organized, lucid form a large and complex subject.

This second edition of a work first published in 1953 has been enlarged to present in current perspective the concepts and techniques as well as the development of knowledge of coagulation. Part I deals with experimental observations and interpretations of various workers and the theories of the coagulation mechanism which have evolved from their researches. The known coagulation factors and their place in the coagulation scheme are discussed. Differentiation between the intrinsic system (blood thromboplastin) and the extrinsic system (tissue extracts) is emphasized; the section on plasma thromboplastin is particularly



good. The phenomena of natural inhibitors, clot retraction, and fibrinolysis are discussed. Descriptions and evaluations of specific tests of clotting functions are presented.

Part II considers the disorders of blood coagulation from a clinical point of view and includes descriptions of clinical manifestations, clotting abnormalities, laboratory findings, and treatments. Thrombosis and anticoagulant therapy are discussed.

The appendices include a glossary of terms, an outline of the systematic approach to investigation of coagulation defects, and detailed methods for the preparation of reagents and coagulation factors and for tests of clotting function.

This is a comprehensive and stimulating book. It is written with authority and with as much clarity and simplicity as the present state of knowledge and confusion in this field of endeavor appears to allow.

LORRAINE GONYEA

•
An International Nomenclature of Yaws Lesions, by C. J. HACKETT, M.D., F.R.C.P., medical officer, Venereal Diseases and Treponematoses Section, WHO, 1957. No. 36 of the World Health Organization Monograph Series. World Health Organization, 103 pages. \$4.00.

Dr. Hackett, whose long acquaintance with yaws is well known, has supplied in this small volume a complete guide to the nomenclature of early and late yaws lesions based upon his own experience and checked with other experts in this nonvenereal form of treponematoses. He has thereby removed the possibility of confusion in the description and the discussion of gross lesions in the bones, skin, and mucous membranes.

The most remarkable feature of this monograph, however, is the section of illustrations, numbering 76 and constituting an atlas of the external and roentgenographic mani-

festations of yaws. The photographs are technically excellent, and each has been carefully selected for its purpose.

Dr. Hackett's classification and atlas promises to assist the clinician not only in countries in which yaws is prevalent but also in those subtropical and temperate regions where treponematoses is present in the form of endemic syphilis and where exactly the same conditions of bone, skin, and mucous membrane are to be found. Presumably, Dr. Hackett still holds the view that *Treponema pertenue* is a valid species and yaws a different disease than syphilis, but this monograph provides good supporting evidence of the essential unity of world-wide treponematoses.

This monograph would be a valuable addition to the library of clinicians and pathologists dealing with some phase of treponematoses. It should be available in every medical school library to show the present day medical student what kinds of lesions *Treponema pallidum* produces when it is propagated endemically and nonvenereally among the primitive peoples of some regions of the world.

E. H. HUDSON, M.D.

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Multiple Neurofibromatosis, by FRANK W. CROWE, M.D., WILLIAM J. SCHULL, Ph.D., and JAMES V. NEEL, M.D., Ph.D., 1956. Springfield, Illinois: Charles C Thomas, 181 pages. \$5.00.

This monograph is one in a series of American Lectures in Dermatology. The authors are dermatologists and geneticists from the School of Medicine and the Heredity Clinic of the Institute of Human Biology at the University of Michigan. Emphasis in this book is, therefore, primarily on skin manifestations and the hereditary aspects of Recklinghausen's disease, though brief discussions of the osseous and central nervous system involvement as well as a summary of the pathology is also included. Nearly one-half of the pages are devoted to a systematic description of 223 affected persons who, with their families, formed the basis for this clinical, pathologic, and genetic study. Separate chapters are also devoted to the frequency of neurofibromatosis and the genetics of both the familial and sporadic cases.

This book is of interest particularly to dermatologists and geneticists, but it also contains material of value for neurologists and roentgenologists.

ERLAND NELSON, M.D.

The Outlook of Vascular Surgery Upon the Aged

CLAUDE R. HITCHCOCK, M.D., and
THOMAS O. MURPHY, M.D.

Minneapolis, Minnesota

THE AGING PROCESS of blood vessels has become a leading cause of death, for currently at least 200,000 persons die in the United States each year of vascular system diseases. This group represents annually about one-seventh of deaths from all causes in this country. Undoubtedly, recent advances in the control of infectious diseases and continued growth and proficiency in all branches of the medical profession through research have created an atmosphere wherein people may expect a longevity well into the seventh decade. Pending a form of medical therapy for arteriosclerosis or a method of prophylaxis against this degenerative disease, we can expect a continuous increase in the group of patients seriously afflicted with arteriosclerosis or its sequelae.

In the present series of patients with "surgical" vascular disease treated at the University of Minnesota Hospitals and the Minneapolis General Hospital up to September 1, 1957, 96 per cent of 260 patients operated upon were 55

years of age or older at the time of surgery. There were 150 patients with occlusive arterial disease, and 91 per cent were age 60 or over as noted in table 1. One hundred and seven, or 71 per cent, of patients in this group were between the ages of 60 and 75 years, while 29, or 18 per cent, were between 75 and 90.

A total of 110 patients have been treated for arterial aneurysms and, again, 90 per cent were 60 years of age or older at the time of surgery. Seventy-four, or 67 per cent, were between the ages of 60 and 75 years; 25, or 22.7 per cent, were over 75 at the time of surgery (table 2).

The ability of older patients to survive and recover from major arterial surgery is noteworthy. The 2 prime deterrents to corrective surgery have been serious cardiac disease or advanced pulmonary disease. In our experience, the major risk rests with anesthesia, and final decisions regarding operation are usually made by the anesthesiologist. Frequently, our anesthesiologists are confident of a successful operation in a patient considered by the internists to be too poor a risk for surgery.

The high degree of success in the present series of cases — 87 per cent success with elective aneurysmectomy and 76 per cent success in bypassing for occlusive disease — adequately substantiates the advisability and value of the direct surgical approach in these patients. Important to success in this type of surgery is the assurance that, following successful technical recon-

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Paper presented at the annual meeting of the Society of Gerontology, Cleveland, October 1957.

TABLE 1
AGE DISTRIBUTION
IN OCCLUSIVE ARTERIAL DISEASE

Years of age		
Under 50	1	
50 to 55	2	
55 to 60	10	
60 to 65	27	71%
65 to 70	44	
70 to 75	36	
75 to 80	10	18%
80 to 85	15	
85 to 90	4	
90 to 95	1	
		150

TABLE 2
AGE DISTRIBUTION OF
PATIENTS WITH ARTERIAL ANEURYSMS

Years of age		
Under 50	1	
50 to 55	6	
55 to 60	4	
60 to 65	18	67%
65 to 70	20	
70 to 75	36	
75 to 80	20	22.7%
80 to 85	5	
		110

stitution of more normal blood flow to provide more normal perfusion of tissues, there are no major physiologic alterations in the patient's body which require over-all or prolonged bodily adjustments. Anticoagulation with heparin during surgery is well tolerated, and the major technical problem to be managed is the maintenance of the blood volume of the patient at or close to the optimum for the patient's cardiac status.

We believe that, with careful attention to technical details at surgery and judicious use of anesthesia provided by experts, most patients can be successfully operated upon for major arterial diseases irrespective of age.

SURGICAL INDICATIONS FOR VASCULAR RECONSTITUTION

At the present time, we feel that the presence of an arterial aneurysm is sufficient justification for surgical repair of the lesion. Recently, the natural history of aneurysms was reported by Estes,¹ who showed that 33 per cent of 102 patients with untreated abdominal aneurysms died within the first year after the lesion was recognized. Only 18 per cent of his series of patients survived five years without surgery. Rupture of an aortic aneurysm is universally fatal unless immediate surgical repair is effected. To our knowledge, no patient with a truly "ruptured" aneurysm has survived six months without surgical therapy. The only primary contraindication to the surgical correction of an aneurysm is cardiovascular-pulmonary disease of such a serious

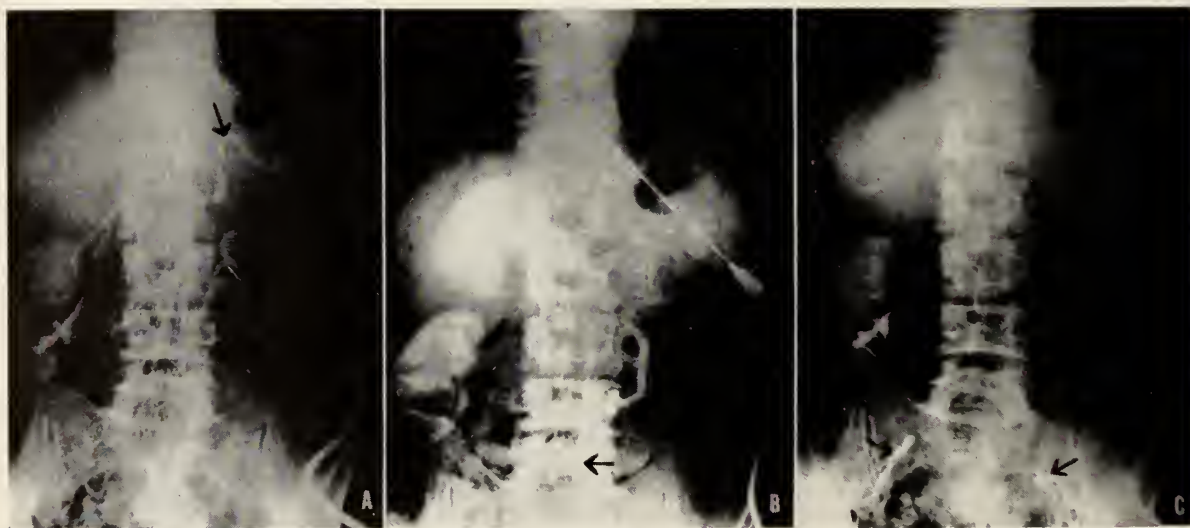


Fig. 1. Aortograms demonstrating an enlarged mesenteric artery providing collateral flow around an obstruction of the distal aorta in an 82-year-old man. This patient could walk 6 blocks without difficulty; arterial by-pass not indicated at this time.

nature that the patient is not a candidate for general anesthesia over a prolonged period of time.

Patients suffering from *occlusive arterial disease* present a more difficult problem in evaluating the necessity for a surgical procedure. Following are 3 important considerations in our evaluation of these patients:

1. Claudication as a symptom of occlusive disease must be present and sufficiently severe to cause limited activity. Figure 1 shows aortograms of an 82-year-old man who had extensive collaterals around an atherosclerotic occlusion of his aorta below the renal arteries. The rich network of collateral vessels enabled this elderly man to walk 6 blocks without difficulty. Such a patient should be managed conservatively until evidence of impending gangrene indicates the necessity of a surgical bypass of the occluded portion of the vessel.

2. Peripheral pulsations below the suspected site of arterial occlusion must be absent. In a series of over 300 arterial angiograms² performed at the University Hospitals and the Minneapolis General Hospital, the distal pulses were absent in all cases of true arterial occlusion. The presence of distal pulses in conjunction with claudication indicates the likelihood of an arterial stenosis but not true obstruction.

3. Angiographic demonstration of the site of obstruction is highly beneficial. Such roentgenograms may be performed safely and without anesthesia when the lesion is below the inguinal ligament or in the distal portion of the upper extremity. These angiograms give confirmatory evidence as to the type, extent, and nature of the arterial occlusion and permit an excellent evaluation of the patency of arteries distal to the point of occlusion. It is paramount that an adequate distal arterial "run-off" be present for the success of an arterial graft or shunt.

In patients presenting the symptomatology noted in the Leriche syndrome — thrombosis of the bifurcation of the aorta — we have preferred to determine the feasibility of performing a bypass shunt from the aorta to the femoral arteries by directly visualizing the bifurcations of the common femoral arteries through a small incision in each groin. If the superficial femoral arteries and the profunda femoris arteries are patent, the patient is a candidate for a shunt procedure. Almost universally, a satisfactory proximal site can be found for the origin of the bypass graft if the distal arteries are adequate to carry the arterial "run-off." After an initial experience of performing angiograms on virtually all patients suspected of arterial disease,² we now tend to

TABLE 3
ARTERIAL ANEURYSMS

Artery	Number	Successes	Failures	Expired
Carotid	1	1		
Axillary	1	1		
Aortic arch	2	0	0	2
Thoracic arch	11	5	0	6
Abdominal aorta	45	37	2	6
Bifurcation aorta	42	31	2	9
Femoral	3	1	1	1
Popliteal	5	4	1	0
	110	80	6	24

use this diagnostic tool less frequently and commonly base surgical correction on the obvious clinical signs and symptoms of the disease.

ARTERIAL ANEURYSMS

One hundred and ten aneurysms of the aorta have been diagnosed and excised in 103 patients from 1954 to 1957 at the University of Minnesota Clinics and the Minneapolis General Hospital (table 3). These patients ranged in age from 16 to 84 years. Eighty-seven aneurysms were in the abdominal aorta, 13 were in the thoracic aorta, and 10 were in peripheral vessels. Ninety-two operations were elective in character, while the aneurysms had ruptured in 18 patients necessitating immediate emergency surgical repair. In the 18 patients operated upon for ruptured aneurysms, 14 deaths occurred and only 4 patients were successfully repaired (success rate of 29 per cent). On the other hand, in the group of 92 patients operated upon electively for aneurysms, there were only 10 deaths, and 8 of these patients had aneurysms of the thoracic aorta (success rate of 87 per cent). Of the 92 patients, 6 were classed as failures due to either a secondary thrombosis or a late rupture of the prosthesis used for the arterial reconstitution. Five of these patients were reoperated upon, and regrafting was accomplished successfully in 4. Thus, the success rate for the whole group of elective aneurysm operations is 87 per cent as compared with a 29 per cent success rate in those cases in which the aneurysms had ruptured (table 4).

OCCLUSIVE ARTERIAL DISEASE

One hundred and fifty operations have been performed for segmental occlusive arterial disease. An attempt was made in each case to either bypass the occluded segment or to replace the blood vessel in continuity. Six patients had a classical Leriche syndrome with thrombosis of

TABLE 4
ARTERIAL ANEURYSMS

Number lesions 110	Operations 114	Patients 103
	Successes	Failures or expired
All aneurysms resected	76%	24%
Elective operations	87%	13%
Ruptured aneurysms	29%	69%
Thoracic aneurysms	38%	62%
Abdominal aneurysms	82%	18%
Peripheral aneurysms	90%	10%

the distal aorta, and these cases necessitated replacement of the bifurcation of the aorta with a graft. Four of these operations have been successful, while 1 graft thrombosed at three months but amputation was not necessary. One patient expired after an immediate thrombosis of the graft. Figure 2 demonstrates one method of alleviating this syndrome by means of a by-pass technic of the aortic bifurcation. In the other 3 patients in whom the operations were successful, a replacement technic was utilized effecting direct arterial continuity.

Forty-eight patients were operated upon for thrombosis of the common iliac or external iliac arteries, and a by-pass type of repair was performed. In 44 of these patients, the by-pass has been successful, while, in 13 instances, the by-pass graft has subsequently thrombosed. However, in none of the patients with subsequent thrombosis of the by-pass graft has an amputation been necessary. Three of the patients in the failure group had obvious gangrene of their distal extremity prior to the surgical attempt to

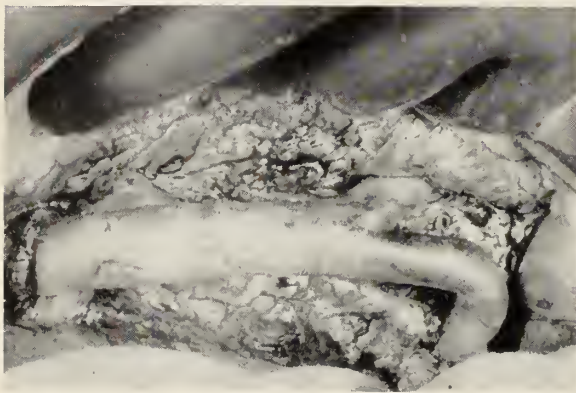


Fig. 2. Arterial homograft used to by-pass the aortic bifurcation which has become thrombosed (Leriche syndrome). Continuity has been re-established from the proximal open aorta to both common iliac arteries distal to the thrombosis.

revascularize the limb. One patient expired following a cardiac arrest during the induction of anesthesia preparatory for an operation of this nature. It is noteworthy that in spite of the advanced age of these patients and the presence of serious cardiac and pulmonary disease, modern methods of anesthesia permit the performance of this type of vascular surgery with significant safety. Furthermore, operations upon occluded peripheral arteries can frequently be performed under local anesthesia with complete comfort to the patient.

THROMBOSIS OF SUPERFICIAL FEMORAL ARTERY

Seventy-four patients had thrombosis of a superficial femoral artery, usually in the region of Hunter's canal. The operation employed in our clinics for alleviation of the claudication of the calf and the ischemia of the foot and lower leg has been a subcutaneous by-pass from the common femoral artery to the popliteal artery principally using crimped nylon shunts. Of the 74 operations attempting to by-pass obstructions of this kind, 58 have been successful and 15 were failures. One patient died shortly after surgery from thrombosis of an occult aortic aneurysm which had not been recognized during the femoral-popliteal by-pass graft procedure, which was done with a concomitant lumbar sympathectomy. A lumbar sympathectomy was performed in a significant number of these patients either prior to or concomitant with the arterial reconstitution if the patient was in good general health and under 65 years of age. The success rate for femoral-popliteal by-pass shunts has been 79 per cent in our clinics. Shunts have proved highly successful when employed to bridge thromboses in the common or external iliacs and in the distal femoral arteries. Furthermore, by-pass of an occluded segment of the popliteal artery in 2 patients has been successful with the use of autogenous vein grafts in these cases (tables 5 and 6 and figure 3).

DISCUSSION

The net physiologic benefit from a successful arterial reconstitution has been well demonstrated in the studies of Creech.³ A more efficient transmission of blood flow and pulse pressure into the distal vascular bed following such surgery has been made possible by means of plethysmographic measurements of peripheral blood flow, ergometric evaluations of the patient on a treadmill, and by the patient's subjective evaluation as he has returned to activity. The tolerance of the elderly patient toward ex-



Fig. 3. Aortograms demonstrating a nylon by-pass technic. Blood is shunted from the left common iliac artery to the left superficial femoral artery, by-passing an obstructed common iliac and external iliac artery. (a). Obstruction at the bifurcation of the common iliac artery on the left side. (b). Prosthesis graft in place with adequate distal flow.

TABLE 5
OCCLUSIVE ARTERIAL DISEASE

Artery	Number	Successes	Failures	Expired
Carotid	7	3	3	1
Subclavian	3	3		
Aortic bifurcation	6	4	1	1
Aorta-femoral	21	16	5	0
Iliac	12	10	2	0
Ilio-femoral	25	18	6	1
Femoral-popliteal	74	58	15	1
Popliteal	2	2	0	0
	150	114	32	4

Nine months shortest follow-up.

TABLE 6
OCCLUSIVE ARTERIAL DISEASE

Artery	Successes	Failures or expired
Carotid	43%	57%
Axillary	100%	—
Aortic bifurcation	67%	33%
Aorta-femoral	82%	18%
Femoral-popliteal	79%	21%
Popliteal	100%	—
Over-all	76%	24%

tensive vascular surgery has been emphasized, and with advanced methods of anesthesia and prevention of hypotension during and after surgery, the results appear to be excellent. Arterial wounds and skin incisions in such patients have

healed rapidly, and usually hospitalization has not been required longer than fourteen to eighteen days.

The ever present problem of accepting the surgical risk of removing a serious aortic aneurysm in the aged patient is real. However, acceptance of conservative therapy imposes a poor prognosis upon the patient in terms of the high incidence of rupture of the lesion and the poor surgical result in these cases. Mortality has been 69 per cent in our hands. On the other hand, in our series, there have been only 2 deaths associated with elective operation for abdominal aortic aneurysm.

The problem of removing aneurysms of the thoracic aorta are great, and we have had a 62 per cent mortality for cases of this type. A pump oxygenator was utilized in 3 patients to by-pass the arch of the aorta during its removal—taking blood from a femoral vein and returning it to the femoral artery—and, in 2 more cases, a shunt assisted by a pump was used from the left auricle to the femoral artery in order to furnish oxygenated blood to the abdominal organs during the period of cross-clamping of the thoracic aorta. In those cases in which the pump oxygenator was used to withdraw blood from the femoral vein and return it to the femoral artery, Arfonad was employed to prevent hypertension in the upper extremities and the head. Technical proficiency must be developed in each institution performing such surgery in order that aneurysms of this type can be managed with increasing safety. Undoubt-

edly, many surgical clinics will be successfully removing aneurysms of the thoracic aorta and reconstituting a normal flow in the very near future.

In those patients with occlusive arterial disease, the decision to attempt a revascularization of the involved portion of the body ultimately depends upon the severity of the patient's symptoms or the presence of impending gangrene. Obviously, the patient without symptoms will not present for surgical correction of a lesion even if an arterial occlusion is known to exist. Indeed, no evidence at this time indicates that prophylactic revascularization of an asymptomatic extremity with occlusive arterial disease is of significant benefit.

The majority of our patients operated upon for segmental arterial occlusions have received a by-pass type of arterial reconstitution rather than an in-line graft establishing direct continuity of the blood flow. Technically, the by-pass graft is easier to accomplish, since the arteries involved in the extremities are usually relatively normal, and end-to-side anastomoses are done with ease. Furthermore, the employment of the by-pass shunt technic does not damage small collateral arteries that are so important to the problem of distal "run-off." In addition, in the event of a subsequent thrombosis of the by-pass shunt graft, the original vascular supply to the extremity is not significantly changed, and the limb, therefore, is not jeopardized. Recent reports from the clinic of Robert Linton⁴ have demonstrated a higher incidence of patency of the by-pass shunt grafts during a follow-up of early cases as contrasted with resections and incontinuity graftings.

The presence of an arterial stenosis does not constitute an indication for vascular reconstitution in our clinics. If a stenotic area is by-passed, the narrowed segment will immediately thrombose after the insertion of the by-pass shunt. If the graft then subsequently fails, as it does in 24 per cent of cases, the limb has been jeopardized due to a significantly diminished blood flow. In contrast, the failure of a by-pass shunt graft around a completely occluded segment of an artery does not significantly alter the blood supply to the distal portion of the limb as mentioned earlier.

Cerebral claudication on the basis of segmental obstruction of an internal carotid artery has been demonstrated in 7 patients in our clinic. These people presented with symptoms of dizziness, mental confusion, and memory disturbances and were found to have a unilateral occlusion of one carotid artery. Revascularization

utilizing venous autogenous grafts was attempted in these patients. Three of them have been treated successfully, and 3 of the grafts ultimately thrombosed. One patient lapsed into coma and expired five days after such an operation, even though a patent graft could be palpated in the cervical area. Recently, it has been reported from other clinics that considerable success with lesions of this kind has been noted after endarterectomy of these segments. Although our attempts at cerebral revascularization are few and the follow-up is short, the initial results indicate that benefits are to be derived from further attempts to improve these patients with surgery.

SUMMARY AND CONCLUSIONS

The surgical experience with 110 arterial aneurysms and 150 cases of segmental occlusive arterial disease has been presented from the University of Minnesota clinics and the Minneapolis General Hospital. In 76 per cent of patients operated upon for correction of a major arterial aneurysm, the procedure was successful. The age of our patients ranged from 16 to 84 years. The significant difference in the success rate of resection of aortic aneurysms in the elective stage as against the ruptured stage—87 per cent compared with 29 per cent—has been emphasized. Most of our success has resulted from the repair of abdominal and peripheral aneurysms.

The surgical correction of occlusive arterial disease utilizing principally by-pass shunt grafts has been presented. The success rate in our clinics for by-pass shunts is as follows: aorta-femoral, 82 per cent; femoral-popliteal, 79 per cent; popliteal, 100 per cent.

The generalized nature of the process of arteriosclerosis in the patient's body must be appreciated, and these surgical procedures have been presented as a palliative approach in the over-all problem of the treatment of arteriosclerosis. Undoubtedly, future studies of the metabolism of lipids and the dietary factors of various ethnic groups will indicate possible methods of prophylaxis against the development of severe atherosclerosis. However, as physicians, we must be courageous in our attempts to prolong the life of our patients in a manner permitting maximum usefulness of all of their faculties. We believe the current surgical approach to serious vascular disease, as outlined in this report, has a significant part to play in the attainment of this goal at the present time.

Arfonad, tri-methane tri-methathane camphor sulfonate used as a ½ per cent intravenous drip, was provided by Hoffmann-LaRoche, Inc.

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UNDISCOVERED STONES in the common ducts are the most frequent cause of symptoms of biliary disease which persist after cholecystectomy. A normal operative cholangiogram is no assurance that the common duct is free of stones, and, if sufficient clinical evidence exists, choledochotomy should be performed.

Of 100 consecutive patients in whom choledochotomy was performed, with removal of common duct stones, 94 were observed for four to six years. Results seem to uphold the soundness of broad indications for this procedure. In the entire series, operative cholangiography was used secondarily to mechanical exploration in detection of stones. Symptoms recurred in only 3 patients — in 2, within one year and, in 1, after four years. Reoperation revealed that 2 patients had previously overlooked or recurrent stone formation and 1 had extensive sclerosing cholangitis.

In another 20 patients who had had common duct exploration prior to referral and who required reoperation for persisting symptoms, preoperative roentgen films showed retained stones in 9. At surgery, multiple stones were found in 11.

Symptoms again recurred in 2 of these patients. At operation, infection and stasis were found in the biliary duct system of both patients, with apparently recurrent stone formation. In such patients, sphincterotomy should be performed in order to allow freer drainage of the biliary tract.

BENTLEY P. COLCOCK, M.D., and HAROLD V. LIDDLE, M.D., Lahey Clinic, Boston. *New England J. Med.* 258:264, 1958.

Lesions of the Oral Mucosa in Some Systemic Diseases

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INSPECTION AND EVALUATION of the oral cavity should be an integral part of any general physical examination. The changes found in oral tissues may be extremely varied. The abnormalities present may be indicative of local disease, or the changes, although minor, may reflect a more generalized pathologic process. Thus, familiarity with the various tissue reactions of the oral cavity as they are a part of systemic disease may enable the physician to evaluate the entire patient in a more direct manner and may indicate the direction in which the laboratory evaluation should proceed.

The importance of knowledge of the oral cavity was recently the subject of an editorial with which I am in agreement. The author stated as follows: "Sir William Osler has called the oral cavity a mirror of the rest of the body. Yet while the changes in backgrounds that are associated with systemic diseases are well recognized, the changes in and around the mouth do not seem to have equal appreciation by the physician.

"Oral tissues are unusually sensitive indicators of the general health status of an individual. This easily accessible, painless diagnostic site particularly reflects initial signs of nutritional deficiencies, endocrine imbalances, gastrointestinal disturbances, communicable diseases, blood dyscrasias including the anemias, and excessive exposure to radioactivity."

For purposes of this discussion, I should like to present pictures of diseases of the oral cavity as if one were looking at them with "gun-barrel vision." Thus, we will exclude from unconscious consideration the associated cutaneous findings and the general status of the patient and rely only on that information obtained by visualizing the oral cavity alone through the lens of the camera. We then can better assess the value of

the findings in the oral mucous membrane if we see them alone and can determine to what degree they may be utilized as a diagnostic tool.

The spectrum of diseases presented for evaluation may be extremely varied, including developmental anomalies; infections caused by bacterial, spirochetal, viral, or mycotic organisms; mucosal changes produced by the contact and ingestion of certain drugs; factitial alterations; benign and malignant neoplasms; and changes in the oral tissues secondary to systemic diseases.

Foremost in consideration are the changes in the oral cavity occurring as part of generalized disease states. The mucous membranes, as well as the skin, often reflect changes in systemic diseases that, in some instances, are characteristic and pathognomonic in themselves and, in other instances, are compatible with the general reaction.

GRANULOMAS

The differential diagnosis of granulomatous lesions of the mouth still includes tuberculosis, syphilis, and malignant tumors. In the presence of a clinical picture of a nonspecific granuloma in which the histologic picture is not that of malignancy, a portion of the tissue removed for biopsy should be subjected to culture and animal inoculation for bacterial and mycotic organisms.

Tuberculosis. A high index of suspicion should be maintained in patients with oral lesions whose histories reveal previous active tuberculosis and who may present the symptoms of fever, loss of weight, and cough together with a positive Mantoux reaction and an increased erythrocyte sedimentation rate. Tuberculosis cutis orificialis is that form of tuberculosis in and about the body orifices found in association with active systemic tuberculosis. The clinical picture of the oral lesions is nonspecific (figure 1). A small fissure or ulcer in the tongue of a patient with a background of active tuberculosis should make one bend every effort to establish the cause as tuberculosis. Recently, the cases of a few such pa-

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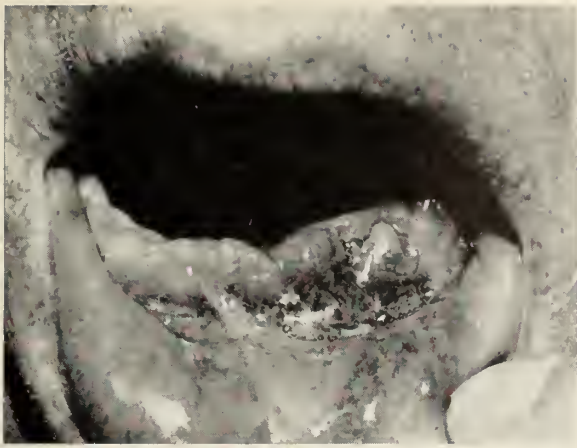


Fig. 1. Tuberculous granuloma of the gum proved bacteriologically.

tients with very minimal ulcers of the tongue were diagnosed by recovering *Mycobacterium tuberculosis* by culture and animal inoculation.

Syphilis. Almost nonexistent today, syphilis still must be considered in the differential diagnosis of granulomas of the oral cavity. Difficulty arises in the diagnosis because of failure to consider the possibility of the disease being present at all.² In patients with gummas, a history of possible syphilis is sometimes of help, but serologic tests for syphilis and laboratory studies on cerebrospinal fluid are necessary adjuncts for proper evaluation of the patient. The granuloma of syphilitic origin does not present characteristics that identify its origin. Unlike the situation in tuberculosis, in which the cause can be confirmed by cultural techniques, there are no laboratory aids that permit the positive identification of such lesions. The histopathologic picture is suggestive of syphilis when a granuloma presents an infiltrate rich in plasma cells, particularly when their location is circumvascular.

The therapeutic test with penicillin given in adequate doses over a sufficiently long period brings about beginning resolution of most syphilitic granulomas within ten days. The rapid response of the patient with syphilis to this antibiotic has necessitated a new standard of treatment for the disease. These destructive syphilitic granulomas of the oral cavity heal with amazingly little residual deformity. A small perforation of the palate is often the only vestige of a large gumma that has been treated properly.

Syphilis at times is accompanied by interstitial glossitis. As a residuum of that process, the tongue may become atrophic, thinned, and tapered and present a vivid magenta hue. These atrophic changes may or may not be associated

with leukoplakia. These composite alterations in the tongue are characteristic of involuted syphilitic glossitis; when they are present, the diagnosis of syphilis usually can be confirmed by appropriate laboratory tests.

Fungous diseases. Among the other diseases of known cause that produce mucous-membrane lesions are those resulting from fungi. Exemplary in this regard, although rare, is South American blastomycosis,³ which frequently begins with a nonspecific, painful granuloma of the mouth and oropharynx. Progression of the disease results in difficulty in eating and swallowing, and the patient's nutrition is affected. Granulomatous cutaneous lesions are also present, and, from these as well as the oral lesions, the causative organism, namely, *Blastomyces brasiliensis*, can be recovered by appropriate methods. The histopathologic appearance of the involved regions is not specific.

Histoplasmosis is another of the systemic mycoses in which oral lesions are relatively common. In fact, cases have been reported in which ulcers of the tongue have been the presenting symptom. The usual findings, however, are those of intermittent fever, loss of weight, weakness, anemia, and leukopenia. The patient also may display hepatosplenomegaly; generalized lymphadenopathy; and nasal, oral, and pharyngeal ulceration.

In a few patients with histoplasmosis who were recently studied, unilateral "perlèche" was one of the findings noted on initial examination. This unilateral involvement is in contrast to the symmetric process seen in patients with ill-fitting dentures whose loss of saliva at the angles of the lips provides a culture medium for micrococci, streptococci, or *Candida*. The specificity of these unilateral fissures at the angles of the mouth was demonstrated by culturing from them the causative organism, namely, *Histoplasma capsulatum*. Nondescript granulomas of the oropharynx may be mistaken for lymphoid hyperplasia, but their true nature can be proved by biopsy and culture.

Local moniliasis, as a part of systemic moniliasis or candidiasis, produces superficial ulcers and a white membrane in association with irregularity and rugosity of the oral tissues. Because of the resemblance of moniliasis, at times, to the oral lesions of systemic lupus erythematosus, these two conditions will be discussed together in a subsequent section.

METABOLIC DISEASES

Macroglossia in amyloidosis and myxedema. In systematized amyloidosis, indurated macroglos-



Fig. 2.
Indurated
macroglossia
pathognomonic
of primary
systematized
amyloidosis.

sia is pathognomonic.⁴ In this disease, amyloid, a mucoprotein, is deposited in the musculature of the vessels and in many of the organs, particularly in the muscles of the intestine and the heart. Because of amyloid infiltration, the tongue may become enormously enlarged, a change that may be the first sign of the disease (figure 2). Associated cutaneous lesions may consist of chamois-colored, translucent papules that can occur anywhere on the body but primarily about the face. Rather pronounced erythema and edema of the hands and forearms may be noted. Similar deposition of amyloid in the vessels results in their friability. Thus, ecchymosis of the tissues may develop even with minor trauma. Multiple myeloma is often an associated disease, the presence of which can be proved by finding myeloma cells in the bone marrow and peripheral blood and by evidence of Bence Jones proteinuria.

Macroglossia also is seen in generalized myxedema, but the tongue in this instance lacks the induration of tissue noted in systematized amyloidosis. In patients with generalized myxedema, the skin becomes dry, thickened, rough, scaly, and somewhat waxy yellow. The hair becomes dull, coarse, thin, and rather unmanageable because of these changes. The enlargement of the tongue makes it difficult to speak. At times, the same edematous quality affecting the pharynx produces huskiness of the voice.

Xanthomas. The metabolism of fat and its role in the production of cardiovascular disease have been the subject of recent investigations. The xanthomas have been long associated with the problem of altered levels of blood lipids. Their presence in some patients in conjunction with cardiovascular disease, diabetes mellitus, diabetes insipidus, and biliary cirrhosis has been recognized for a long time. In some patients,

these cutaneous xanthomas are accompanied by mucosal deposition of the same fatty material, which imparts an orange-brown hue to the tissues involved. The color of the gum tissue in this disease is unique.

Addison's disease. Generalized pigmentation of the skin and macular hyperpigmentation of the mucosa are common in Addison's disease (figure 3a). The general complaints of weakness, easy fatigability, and loss of weight in association with the laboratory findings of hypotension with a small pulse pressure and decreased urinary excretion of 17-ketosteroids are the paramount criteria in diagnosis. The brownish pigmentation of the skin, most prominent in the folds and those areas exposed to the sun, together with mottled pigmentation of the lips and buccal mucosa, adds confirmatory evidence.

Peutz-Jeghers syndrome. In contrast, however, macular hyperpigmentation of the lips and buccal mucosa unassociated with generalized hyperpigmentation may be the clue to the diagnosis of Peutz-Jeghers syndrome, namely, oral pigmentation with intestinal polyposis (figure 3b). Discrete zones of macular pigmentation also may occur about the face, the root of the nose, the eyelids, and the tips of the digits. The entire gastrointestinal tract of these patients must be studied, as polyps may be found in any of its parts. Recent study indicates that malignant degeneration of the polyps does not occur in this form of polyposis.⁵

The blue pigmentation of the oral mucosa seen in patients taking quinacrine hydrochloride (Atabrine) is hardly to be confused with the black macular pigmentation seen in either Addison's disease or the Peutz-Jeghers syndrome.

HEREDITARY DEFECTS

Recklinghausen's disease. The tumors in neurofibromatosis, or Recklinghausen's disease, most commonly involve the skin but are present in other tissues, including the tongue (figure 3c). The cutaneous lesions consist of variously sized, red to violaceous, soft tumors that can involve any portion of the integument. Brownish macular zones of hyperpigmentation (café au lait spots) are part of this hereditary syndrome, which includes rather low physical and mental ability in many members of a family. These lesions are rarely localized solely on the tongue. The individual tumors in this location are firm. Unless excessive growth interferes with articulation and nutrition, treatment is not required.

Telangiectasia. Multiple telangiectatic lesions occur on the face, palate, tongue, nasal septum, and body of patients with familial or hereditary

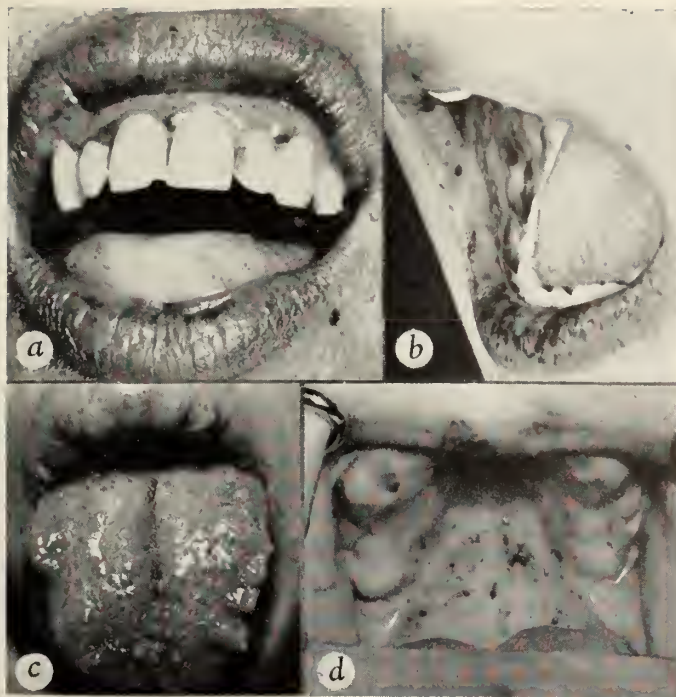


Fig. 3a. Pigmented macules on lips and gums in Addison's disease. (b). Pigmented macules on lips and buccal mucosa led to diagnosis of intestinal polyposis in this case of Peutz-Jeghers syndrome. (c). Lingual neurofibromas in Recklinghausen's disease. (d). Oral lesions in hereditary hemorrhagic telangiectasia.

hemorrhagic telangiectasia, or Rendu-Osler-Weber disease (figure 3d). At times, conglomerate capillary tufts or small angiomas are present with the telangiectasis, presenting a small tumor formation much like senile ectasia. Rupture of these vascular lesions results in hemorrhage that often causes anemia. Hemorrhage can be sudden and sufficiently severe to cause a shocklike state and death. The disease is found in and transmitted by both sexes. The possible presence of pulmonary arteriovenous fistulas in patients with hereditary hemorrhagic telangiectasia should not be overlooked.

POLYOSTOTIC FIBROUS DYSPLASIA

This is a disease in which the central portions of bones are replaced by connective tissue, which grows and expands the bones. Osseous spicules subsequently develop in this connective-tissue stroma. The combination of fibrous dysplasia of bone, macular pigmentation, and sexual precocity in women, in association with disturbances of hormonal balance and growth, is known as Albright's syndrome. Peculiarly enough, the maxilla is frequently involved early, and, thus, enlargement of one maxilla may give a clue to the early diagnosis of this disease.

LUPUS ERYTHEMATOSUS

Since the introduction of the L. E. test of Hargraves for lupus erythematosus, considerable

attention has been focused on this entity. The discoid variety of this disease—cutaneous lesions without general systemic complaint—is seen with regularity. Systemic lupus erythematosus, however, is a rare disease characterized by recurrent arthralgia, fever, and fatigue, particularly affecting young women of fair complexion. In the past, a butterfly eruption over the face was considered pathognomonic, but today the aforementioned three symptoms associated with polyserositis, recurrent infection, Raynaud's phenomenon, and nonspecific cutaneous eruptions, such as urticaria, purpura, and erythema multiforme, keynote the diagnosis. Patients who have systemic lupus erythematosus are frequently so ill that the physician is unconcerned with the presence of oral lesions. Hyperkeratosis of the mucous membrane presents itself clinically as a white sheen in the involved zones. Some rugosity of the tissues and superficial erosions and ulcers may be present. The oral lesions are essentially asymptomatic, except when ulceration is present, and are not diagnostic by themselves. Together with any cutaneous lesions and symptoms, they resolve as appropriate therapy is administered.

Leukoplakia, moniliasis, lupus erythematosus, and lichen planus present lesions of the mucous membrane that at times are indistinguishable clinically. The last two conditions may present collateral evidence of the disease on the skin that makes the diagnosis apparent. The causa-

tive organism, *Candida albicans*, can be cultured from the lesions of patients with moniliasis.

Leukoplakia is a hyperkeratotic reaction of mucous membranes that appears to be precipitated by constant trauma of various types. The role of syphilis and interstitial glossitis in the production of leukoplakia already has been mentioned. White, spongy nevus of the oral cavity is rarely confused with any of these lesions because of its extensive involvement of the oral tissues and the history of its presence in even young members of the family.

BLISTERING ERUPTIONS

When generalized blistering eruptions are seen, the differential diagnosis is primarily between dermatitis herpetiformis, erythema multiforme, and the various forms of pemphigus. Although exceptions occur, dermatitis herpetiformis rarely has associated oral lesions. On the other hand, erythema multiforme and pemphigus frequently present lesions of the mucous membrane as a part of their morphologic picture.

Although it has a rather characteristic morphologic picture, erythema multiforme does not denote an etiologic entity. Rather, it is seen as part of the systemic reaction in a variety of conditions: namely, septic sore throat, arthritis, and drug reactions. As the name of the disease implies, the cutaneous lesions are characterized by multiform, erythematous papules and plaques. Its differentiation from urticaria is sometimes difficult, but the presence of iris lesions, formed by concentric alternating zones of involved and uninvolved tissue with a bullous reaction in the center, categorizes this disease as erythema multiforme. When blisters are present in the oral lesion, they are hemorrhagic in nature in the majority of cases. As a rule, however, the oral lesions soon rupture, and nonspecific ulcers are formed that are not diagnostic. Characteristic cutaneous lesions must be present in order to make the proper diagnosis.

Since the introduction of the therapeutic use of corticotropins and corticosteroids, the course of pemphigus has been tempered, but it still has a grave prognosis. The clinical picture in this disease is characterized by bullae of various sizes on the skin, with or without an urticarial component. As the disease progresses, severe systemic repercussions are noted, with debility and decline in the general health.

Blisters frequently develop in the mouth. The individual oral lesions may hang as large blebs like stalactites from the hard and soft palate. Rupture of these lesions produces superficial ulcers; the process at times becomes more se-

vere, with ragged, irregular ulcers of the oral cavity supervening.

The cutaneous lesions of erythema multiforme and pemphigus may be differentiated histologically, with epidermal-dermal separation denoting the former and intra-epidermal disintegration characterizing the latter. Acantholysis, which is the separation of individual epidermal cells from the neighboring cells through rupture of the intercellular bridges and associated degenerative changes of the nucleus and cytoplasm, characterizes pemphigus.

One of the diseases of viral origin that may affect the oral cavity is herpes zoster, which is caused by a neurotropic virus. This is a blistering eruption associated with severe pain that takes a segmental distribution along the course of nerve trunks. The involvement is almost always unilateral, particularly when cranial nerves are affected. Involvement of various branches of the fifth cranial nerve is a frequent clinical finding. If the dental branch of the middle division of this nerve is involved, unilateral blistering of the hard and soft palate is seen.

HEMATOLOGIC DISEASES

The oral changes in patients with pernicious anemia have been recognized for many years. The laboratory findings include achlorhydria, hypersegmented neutrophils, and macrocytic anemia. Weakness, gastrointestinal disturbances, and neurologic complaints are frequently part of the clinical picture. Changes in the oral mucosa are suggestive of the disease; these consist of a red, smooth, atrophic tongue produced in part by recurrent blistering and disappearance of the papillae. Soreness and burning are present in a large proportion of these patients.

A hemorrhagic tendency of the mucous membranes and thrombosis of the skin with subsequent ulceration are among the signs that characterize the clinical picture of polycythemia vera (figure 4a). The basic problem is that of an excessive number of erythrocytes independent of a physiologic increase in number due to exposure to high altitudes. The disease affects men and women with equal frequency, usually during the middle decades of life. The increase in erythrocytes can account for most of the cutaneous features of the disease, which include a plethoric facies and cyanosis of the acral areas (including ears and hands), together with headache, tinnitus, cerebral thrombosis, and phlebitis. Because of the superficial position of the vascular bed in the mouth, hemorrhage frequently occurs.

Multiple myeloma represents a neoplastic process in which overgrowth of myeloma cells

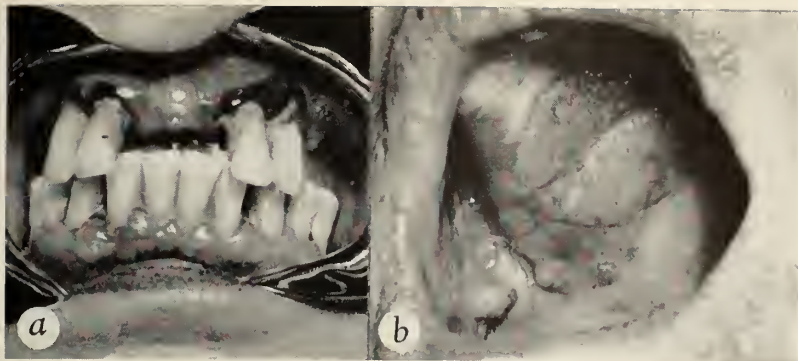


Fig. 4a. Hemorrhagic oral lesions in polycythemia vera. (b). Tumor of palate in multiple myeloma.

occurs in various tissues and organs. Hemocytologic and bone-marrow studies for myeloma cells and urinary studies for Bence Jones protein are necessary adjuncts to diagnosis. Tumors are rarely seen in the oral cavity as a part of the clinical picture in this disease, but they do occur from time to time (figure 4b).

As might be anticipated in thrombocytopenic purpura, hemorrhagic manifestations are common, with oral involvement being the usual finding in such patients. The clinical picture is usually that of punctate purpura progressing to ecchymosis and finally to gross bleeding from the oral tissues, particularly the gums. It has been recognized for a long time that even the slightest trauma may initiate this sequence of events. On the other hand, they may develop spontaneously without apparent antecedent trauma.

Agranulocytosis and aplasia of the bone marrow produce the same clinical picture regardless of the cause. Exposure to various chemicals, the ingestion of certain drugs, or total body irradiation may be responsible. With decrease in the number of granulocytes in the blood, ample opportunity for infection occurs, so that bacteria, which are commonly present in great numbers within the oral cavity, multiply and flourish luxuriantly. One of the earliest signs of granulocytopenia is the development of white plaques on the mucous membranes that represent foci of bacteria. Gingivitis, ulceration, and necrosis, with frank bleeding from the tissues of the oral cavity, occur later. These changes are associated with the systemic signs of overwhelming infection, melena, a shocklike state, and often death.

Splenic neutropenia is a disease in which the cyclic destruction of neutrophils by the spleen occurs at irregular intervals. When a period of neutropenia exists, marginal gingivitis, ulcers, and recurrent infections of the mouth are likely to be present.

Infectious mononucleosis is recognized primarily by the constitutional symptoms of fever, malaise, and general lymphadenopathy, particularly in the cervical region, together with the presence of abnormal lymphocytes in the blood and an increased titer of heterophilic antibodies in the serum. Oral lesions are not uncommon in this disease, consisting, at times, of general inflammation of the oral tissues with soreness and, on occasion, edema of the uvula and, less frequently, of ulcers in the tonsillar region. Characteristic, when present, is a petechial eruption lasting for two to four days on the roof of the mouth at the junction of the hard and soft palate.

In the past, reference was made to lymphatic leukemia and myeloid leukemia as entities. Recent nosology favors a broader concept and considers leukemia itself as part of an entire clinical picture. Classification into two groups clarifies the problem by designating as lymphoma those malignant tumors which usually arise from multiple foci in the lymphoid reticular system, with lymphatic leukemia being associated with only a portion of these tumors, and by designating as myelosis those malignant tumors usually arising from multiple foci in the myeloid system and with which leukemia, myeloid in type, invariably is associated.

Cutaneous and mucous membrane manifestations of the leukemic states may be specific (metastasis from within) or nonspecific, such as erythema, purpura, and ulceration. Differentiation of these entities based on the clinical appearance of oral and cutaneous lesions is impossible. Hemocytologic studies of peripheral blood and bone marrow, as well as biopsy of lymph nodes and skin, often are required for definite diagnosis.

The lesions of the oral mucous membrane in the leukemic state are characterized by red spongy gums that tend to bleed easily even with minimal trauma (figure 5). Superficial ulcers and necrotic lesions may be produced at times.



Fig. 5. Red, spongy, hemorrhagic gums in monocytic leukemia.

Purpuric, hemorrhagic, and bullous lesions are relatively common. Purpura, as an isolated finding, is nonspecific in nature and is found as a terminal toxic manifestation in either lymphoma or myelosis. Lesions of the mucous membrane consisting of swelling and ulceration of the gums apparently occur earlier in the course of the

disease in patients with monocytic leukemia. As a group, however, oral lesions are found more frequently in chronic lymphatic leukemia. As emphasized previously, the histopathologic picture may be nonspecific or the gingivitis and ulceration may be specific, as determined by further study of histologic preparations.

SUMMARY

An attempt has been made to emphasize the importance of a meticulous examination of the oral cavity as an aid in the diagnosis of systemic diseases. In some instances, changes in the oral cavity may be pathognomonic, whereas, in other cases, they may only indicate the direction in which laboratory evaluation should proceed in order to establish the diagnosis.

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TRANSIENT CUTANEOUS FLUSHING is characteristic of patients with functioning carcinoid, although cardiac, respiratory, and gastrointestinal symptoms may be lacking. The flush may last as long as thirty minutes but usually persists less than ten. The process may be repeated many times a day.

The face is most frequently and severely affected, but the entire torso and arms and legs may be involved. During a flush, the face and upper part of the body may feel hot, stiff, and swollen. Paresthesias of the fingers may be noted. The scleras are reddened. Cyanosis may appear in spots in the area of flushing. The central portion of the flush subsides first; the fading extends peripherally and leaves gyrate and serpiginous patterns.

As flushing becomes chronic, telangiectasia is evident and cyanosis is persistent. The patient ultimately appears plethoric, but the erythrocyte and leukocyte counts, cell volume, and hemoglobin concentration remain normal. Hypotension frequently occurs a few seconds after the appearance of a flush and may result in syncope and, in some instances, even shock.

Flush may occur spontaneously or be precipitated by ingestion of food or alcohol, mechanical stimuli, emotional upsets, sudden temperature changes, or evacuation of the bowel.

Histologically, the affected skin shows dilatation and congestion of veins and capillaries; occasional thickening of vessel walls, including arterioles; edema; and chronic inflammation.

ROBERT R. KIERLAND, M.D., WILLIAM G. SAUER, M.D., and WILLIAM H. DEAEING, M.D., Mayo Clinic and Foundation, Rochester. *Arch. Dermat.* 77:86, 1958.

Sex Hormone Support for the Castrate or Senescent Woman

TACE with Androgen: A Review of Experience

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"STEROID REPLACEMENT TECHNIQS in no sense represent a panacea for the problem of aging. There is no evidence of increased longevity for those patients under combined steroid influence. However, in the majority of treated patients, there is significant physical and mental resurgence of power potential."¹

It is hardly necessary in this enlightened year to restate or defend the rationale of sex hormone replacement in the aging. The constantly improving methods of measuring urinary steroid excretion have now given factual support to earlier hypotheses regarding probable declines in levels of certain, if not all, steroid hormones with advancing age. Evidence is now irrefutable that the output of ovarian and testicular hormones declines much more rapidly and to lower levels than does that of the adrenocortical steroids. In fact, relatively short functional life of the gonads—from puberty to the climacteric—as compared with that of all other endocrine glands has led Masters² to describe the existence of a "third sex" or "neutral gender."

The physical and emotional symptoms which accompany the decline in gonad function are frequently of such magnitude that the individual is motivated to seek relief. A large segment of patients comprising the average gynecologic practice consists of postmenopausal women, many of whom have experienced relative failure of relief from the heavily promoted drugstore panaceas. Women are certainly far more subject than men to stress resulting from these changes, since ovarian function ordinarily is depressed abruptly at the menopause, while testicular function usually declines at a slower rate over a longer period of time. Thus, men are

granted by their Maker a reasonable period of time for adaptation to the "neutral gender" status.

Although one would assume from theoretic considerations that simple replacement of declined ovarian steroid levels in the female should suffice to halt and reverse the changes, we have learned through much trial and error that such treatment has certain disadvantages. Continuous support with estrogens alone in the female climacteric leads frequently to endometrial hyperplasia and breakthrough bleeding. Cyclic treatment with estrogens or with estrogens and progesterone results in periodic endometrial slough. While such vaginal bleeding or "false menses" is in itself not necessarily pathologic, it is far better to use a treatment, if available, which accomplishes the desired end result without substituting one type of worry for another. Combined therapy with properly balanced amounts of estrogen and androgen is now well established as fulfilling the essential requirements for physiologic steroid replacement in these patients.

Reduced to the simplest possible hypothesis, the beneficial extragonadal effects of these hormones are considered to be due to the ability of estrogens to increase permeability of the cell membrane and the tendency of androgen to promote storage of protein. Thus, there exist mutually enhancing metabolic and anabolic activities of the two types of hormones which may be controlled through their concomitant administration in proper proportion. The beneficial results of combination therapy upon calcium and phosphorus metabolism, promotion of protein matrix sparing, formation in osteoporotic bone and in muscle, and improvement in the tone and integrity of the vascular system may all be related to increased permeability of the cell membrane and enhanced storage of protein. In addition, there appears to be a "mutually antagonizing" activity of the two steroids in terms of

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their effects upon the sex organs. For example, the tendency of estrogens alone to stimulate endometrial hyperplasia is satisfactorily blocked by androgen added in appropriate amount. This eliminates the principal disadvantage of therapy which subjects the endometrium to cyclic change and adds the further advantage of protein-sparing activity.

There are now well over 50 prescription pharmaceuticals available, which contain a variety of combinations of estrogenic and androgenic substances for both oral and parenteral administration. The physician's task of choosing a medication for his patient has become most difficult. In many instances, it is possible that the choice of preparation depends principally upon the persuasiveness of the representative of the pharmaceutical manufacturer concerned, the effectiveness of the manufacturer's advertising program, or the reputation of the company. Perhaps such factors were involved in our choice of TACE with Androgen for the treatment of those patients in whom we thought combination steroids were indicated. However, as we reported in 1954,³ our experience with TACE in the management of symptoms associated with the menopause had always been most gratifying. Because of the ability of TACE to become stored in body fat, resulting in a "depot" effect, and the absence of annoying side effects, especially nausea, following its administration, this unique and orally effective pro-estrogen enables the menopausal patient to adapt easily to her ultimate postmenopausal state.

Combined steroid therapy should be minimal for those patients who continue in the postmenopause to require such support. The combination capsule of TACE with Androgen contains 6 mg. of chlorotrianisene and 2.5 mg. of orally active methyltestosterone. The structural formulas for these compounds are shown in figure 1. Neither of the hormones is provided in sufficient quantity to cause undue feminizing or virilizing effects after prolonged daily administration of a single capsule. In fact, both are considered to be in a "mutually neutralizing" ratio when larger doses infrequently become necessary. Experience supports our earlier belief that most patients obtain optimum benefit in terms of symptomatic relief as well as metabolic and anabolic support from an average dose of 1 capsule daily.

MATERIAL AND METHODS

Following the preliminary phase of the present study, we reported⁴ consistently good results in the management of subjective symptoms and objective findings in 34 selected postmenopausal

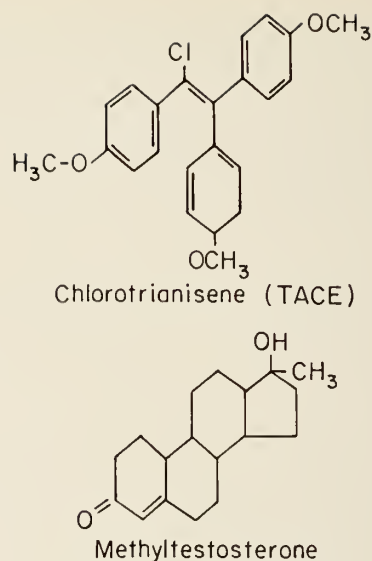


Fig. 1. Structural formula of chlorotrianisene and methyltestosterone.

patients who were treated initially with 2 capsules daily for ten days, after which they were maintained with a dose of 1 capsule daily. Of the 34 patients, 27 had undergone natural menopause, and the remaining 7 had been eastrated either surgically or by irradiation.

It has now become possible to review continued experience with the original group of patients and to extend observations to include a total of 92 patients who have been treated with TACE with Androgen for similar complaints. Of these, 67 patients are past the natural menopause, 24 have been eastrated surgically, and 1 patient was castrated by irradiation. The range in age of the group is 29 to 71 years, and most of the patients are 45 or older. All are ambulatory, white, private patients who have been observed for varying periods of time up to two years. All patients complained of one or more symptoms of a complex which we have chosen to call the "postmenopausal syndrome." These complaints are listed in order of frequency in table 1.

Of the 92 patients under study, 22 had received previous drug therapy for their symptoms, consisting of estrogens alone, estrogen-androgen combinations, or sedation. They were selected for this study because of inadequate symptomatic control by previous medications or the occurrence of side effects.

All patients in this series were given 2 capsules of TACE with Androgen daily at the outset of treatment. After 10 days, the dose was reduced empirically to 1 capsule daily and generally maintained at this level. Six of the pa-

TABLE 1
EFFECTIVENESS OF TACE WITH ANDROGEN
IN CONTROL OF SYMPTOMS OF THE POSTMENOPAUSAL
SYNDROME IN 92 PATIENTS

Symptoms	Number complaining	Complete relief	Partial relief	No relief
Hot flushes	52	47	4	1
Urinary	28	19	6	3
Nervousness	26	24	2	0
Depressed libido	15	14	0	1
Irritability	13	12	1	0
Dyspareunia	11	8	3	0
Insomnia	10	10	0	0
Backache	8	5	1	2
Depression	5	4	1	0
Fatigue	4	2	1	1
Headache	3	2	1	0
Vertigo	3	3	0	0
Pruritus vulvae	2	1	1	0
Palpitation	2	2	0	0
Mastalgia	2	2	0	0
Muscle pains	2	2	0	0
Paresthesias	2	2	0	0
Joint pains	1	1	0	0
Anxiety	1	0	1	0

tients voluntarily have taken the medication on an irregularly intermittent schedule. Because of the complaint of "pelvic pressure" in 1 patient, the dose was reduced to 1 capsule every other day, resulting in relief of this symptom but only partial relief of her stress incontinence and pruritus vulvae. Three other patients obtained only partial symptomatic relief when 1 capsule was given daily but were completely relieved when the dose was increased to 2 capsules a day.

RESULTS

The control of subjective complaints among the 92 patients in the series (table 1) has been highly gratifying to us and to the patients. Only 1 of the 52 patients who complained of hot flushes was not relieved. One of the 15 patients with loss of libido and 1 of the 4 patients complaining of fatigue failed to obtain some measure of relief. Of even greater interest and significance is the fact that relief failed to occur in only 3 of the 28 patients who complained of urinary symptoms, such as frequency, dysuria, and urge and stress incontinence associated with senile vaginitis. In this group, no abnormalities were detected upon urinalysis, indicating that the symptoms were not due to chronic cystitis or lower urinary tract disease. The improvement following endocrine therapy is indicative of positive protein anabolic effects

TABLE 2
OBJECTIVE RESULTS OF TREATMENT WITH TACE
WITH ANDROGEN IN 92 PATIENTS WITH POSTMENOPAUSAL
SYNDROME

Objective finding	Number of patients	Treatment effective	Treatment partially effective	Treatment ineffective
Senile vaginitis	44	36	6	2
Osteoporosis	8	5	1	2
Vaginal dryness	6	5	1	0
Hair and skin changes	2	1	1	0
Vulvar irritation	1	1	0	0
Tight introitus	1	1	0	0

with subsequent improvement in muscle tonus. No other failures of symptomatic relief were reported. Complete relief occurred in most patients with virtually all types of complaints. All patients obtained some degree of relief.

Improvement in objective findings was noted in the majority of instances in which such findings were apparent. Table 2 is an outline of this experience. Except in the cases of osteoporosis, objective improvement was graded by direct observation. The most frequent complaint in senile osteoporosis is back pain, although pain may sometimes occur in association with osteoporotic areas of bone other than the spine even in the absence of pathologic fracture. All of our 8 cases of roentgenologically proved senile osteoporosis had subjective complaints related to their lesions. Complete relief in 5 of these cases, partial relief in 1, and no relief in 2 are reflections only of the symptomatic improvement (or lack of it) in these patients.

Except for 1 patient who complained of a sensation of increased pelvic pressure when she was given 1 capsule daily, there have been no significant side effects attributable to TACE with Androgen in this series. Relief in this patient was achieved by reducing the dose to 1 capsule every other day. It may be stated categorically that the dose of TACE with Androgen seldom needs to be altered from the average maintenance level of 1 capsule per day. Younger women who have been castrated surgically may require 2 or even 3 capsules daily for adequate symptomatic control. Conversely, it has been possible in several instances to reduce the dose in elderly women with senile vaginitis to 1 capsule every other day. We have had only 1 case of postmenopausal spotting, which occurred in a 53-year-old woman who had been receiving TACE with Androgen. Diagnostic dilatation and curettage in this instance revealed the presence

of endometrial polyposis, and, therefore, it was considered advisable to discontinue hormone treatment.

During the period of this study, we have also been prescribing TACE with Androgen to promote vascularity and enhance healing for all patients with senescent vaginal changes who have been treated surgically. These patients are not included in the present tabulation because it has been assumed that many of their symptoms were probably related to the presenting pathologic changes, such as urethrocele, cystocele, and rectocele. This group of patients has responded more than satisfactorily to TACE with Androgen treatment in the usual dose of 1 capsule daily. Many such patients who are treated surgically for these conditions find that, although they are improved symptomatically, intercourse is frequently difficult and painful. In none of the patients of this series has postoperative dyspareunia been a complaint. The subjective response of this group has been most gratifying.

SUMMARY AND CONCLUSIONS

Ideally, a useful estrogen-androgen preparation for the management of the postmenopausal syndrome should be orally effective. It should contain only sufficient quantities of the two hormones to provide the desired metabolic support or replacement with mutual neutralization of the potentially undesirable genital effects. These qualities have been most nearly approached by TACE with Androgen, which was studied clinically during a two-year period in 92 private patients with a variety of postmenopausal symptoms. Subjective and objective improvement have been noted in all types of complaints and findings associated with the syndrome and in the great majority of cases. No serious side effects have been encountered, and none of the patients has been unable to tolerate the medication because of nausea and vomiting. The maintenance dose of 1 capsule daily is usually preceded initially by 1 capsule twice daily for ten days.

TACE and TACE with Androgen were supplied for this study by The Wm. S. Merrell Co., Cincinnati.

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SURGERY MAY BE PERFORMED advantageously during the puerperium for umbilical hernias, perineal tears, fistulas, rectoceles, ovarian cysts, and intestinal complications. Healing is very efficient during this period, and many tissues, hypertrophied by pregnancy, are conveniently lax for easy dissection and have a rich blood supply.

The immediate postpartum period is a particularly ideal time for repair of umbilical hernias because strangulation may occur after labor and because the abdominal wall is slack.

D. H. BLAKEY, M.D., University of Sheffield, England. *Lancet* 2:1312, 1957.

MOST OF THE TOXIC PHENOMENA of pregnancy can be relieved by a diet high in salt. For patients with early toxemia, the larger the amount of salt, the faster and more complete the recovery. All of 20 women with early toxemia were benefited by extra salt in the diet. Symptoms recurred when additions were not continued until the time of delivery. Of 1,019 women instructed to increase sodium chloride intake, 38 had toxemia; of 1,000 women who decreased salt consumption, 97 had toxemia. The incidence of edema, perinatal death, and hemorrhage during pregnancy and ante partum was also lower in women taking extra salt.

MARGARET ROBINSON, M.D., Derby, England. *Lancet* 1:178, 1958.

Postoperative Medical Emergencies

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THE PURPOSE OF THIS PAPER is twofold: first, to acquaint the consulting medical residents with certain procedures and drugs used in surgery which predispose the patient to postoperative complications for which these physicians are likely to be called on for consultation; second, to provide in general a review of the literature which will facilitate reading on any operative medical problem encountered.

Moore¹ describes the normal postoperative pattern of response as a transient rise in temperature, increase in pulse rate, transient decrease in urinary output, negative nitrogen balance for three to seven days changing to positive nitrogen balance, excessive potassium loss for two to five days, decreased sodium loss for two to three days, increased fat oxidation, and increased secretion from the adrenal cortex. These conditions require treatment only when aggravated by complications.

EXTRARENAL FLUID AND ELECTROLYTE LOSS

When confronted with the correction of fluid and electrolyte loss postoperatively, there is no substitute for accurate collection and calculation of specific losses, after which an estimation of fluid and electrolytes is necessary. The accompanying graph lists the "average" losses of electrolytes from specific drainage sites in the normal functioning gut. These values are means, and they have side ranges and can serve at best as only rough estimations of losses. All values listed are in mEq. per 1,000 cc.²

	Na	K	Cl
Gastric	59	9.3	89
Duodenum	104	5	99
Ileum	116	5	105
Ileostomy	129	16	109
Cecostomy	79	20	48
Urine	17-200	50	250
Bile	145	5	99

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When estimating losses, it is important to be sure of the location of the Miller-Abbott or Levin tube. An easy way to do this is to test the pH of the secretions. Those of the Miller-Abbott tube, when in the small intestine, almost always test alkaline. The secretions of the Levin tube usually test acid but may test alkaline due to reflux. Of course, a roentgenogram is best when in doubt.

The necessity of using suction to prevent distention with shock, breakdown of gut anastomosis, and wound dehiscence is well established. Occasionally, tubes are left in too long. They are usually left down until bowel sounds have returned and peristalsis is capable of producing flatulence and if the nasal gastric tube, when clamped for two hours, does not produce more than 30 to 50 cc of fluid.

It is not surprising that some very interesting electrolyte problems are encountered in surgery. A few of the more common types will be discussed.

According to Moore, there are 3 types of low sodium syndromes: sodium paradox, excess body water with low or normal body sodium, and decreased body water with low or normal sodium (dehydration). A slight decrease in serum sodium after operative trauma is due, in part, to water shifting from the intracellular space at a more rapid rate than the electrolytes. This produces a relative hyponatremia of the extracellular compartment and cellular dehydration. This, according to Randall and associates,⁴ probably explains the mechanism of decreased urine excretion on the basis of an increase in the anti-diuretic hormone. Subsequently, a mild hyponatremia is produced, which promptly resolves itself in the second to fifth postoperative day. When the aforementioned condition is superimposed on a preoperative hyponatremia, usually found in the general debilitated patient who also frequently loses additional sodium from suction, after traumatic surgery in patients with localized edema, or in cases of traumatic peritonitis, a serious sodium deficiency results. This is often unrecognized until shock or convulsions intervene. To correct this deficit, the general condition of a patient with low sodium should be built up

preoperatively, but, in an emergency, adequate replacement can be instituted.

The problem of hypochloremic alkalosis from vomiting or gastric suction is usually one of inadequate replacement and is encountered in its severest form with pyloric obstruction. Treatment consists primarily of replacement and surgical correction. A rule of thumb commonly used in restoring gastric and colon losses and small bowel losses is to replace two-thirds of the gastric and colon loss with normal saline and the rest with dextrose and water, while liter for liter of normal saline is used for small bowel losses adding, in both instances, the estimated or measured potassium losses.

Flink⁵ believes that the problem of magnesium deficiency may be expected during surgery in patients with liver diseases and prolonged intravenous therapy. Muscle twitching, convulsions, disorientation, and so forth may be remedied by magnesium sulfate treatment.

The problem of "water intoxication," excess water with low or normal body sodium, is a result of the excess administration of fluids, which is, in a sense, antagonistic to the normal surgical response of relative cellular dehydration and the increased antidiuretic hormone, resulting in retention of water. It again is encountered in the debilitated, traumatized patient.

When excessive blood loss is expected or a patient is suspected of having decreased blood volume prior to surgery, a blood volume determination preoperatively would be quite advantageous in blood, fluid, and electrolyte management, especially when compared to postoperative blood volume studies. It is far more accurate to measure the change than to resort to an estimation of the change. The normal red cell mass varies with sex and age. In general, old people have a 10 per cent decrease in RCM. For practical purposes, the $RCM = \text{hematocrit} \times \text{the blood volume}$. According to Perry and associates,⁶ normal values are obtained by dividing the RCM in cc.'s by the ideal weight. The ideal weight is based on life insurance weight curves, adding one-third to one-quarter of a pound for every pound of fat and subtracting 10 per cent if the patient is over 60 years old. These values are 38.1 cc. per kilogram for normal men, 34.3 cc. per kilogram for men over 50 years of age, 32.6 cc. per kilogram for normal women, and 28.6 cc. per kilogram for women over 50. Other than actual blood volume studies, there are clinical signs which help in detecting abnormal blood volumes. The pulse increases to maintain blood pressure with a decreased blood volume, but shock develops when blood

volume is reduced to the point where increased pulse and vasoconstriction are ineffective. A warning of this end point can be elicited by having the patient sit up and noting the change in pulse and blood pressure, at which time he often turns cold and clammy. An earlier index in cases in which blood volume is chronically reduced is the "dangle sign," which occurs when the veins in the dorsum of the hand fail to fill when the hand is allowed to dangle.

In a twelve-hour distribution period, 1 unit of blood will raise a decreased blood volume .5 to 2 per cent and will increase a normal or overloaded blood volume 3 to 6 per cent. Unfortunately, when overtransfusion exists, we usually cannot wait twelve hours to give another unit of blood. Again, a pre- and postoperative blood volume determination would be very informative.

Fraser and associates⁷ feel that hypoproteinemias in the poor risk patient should be corrected with 1,000 cc. of plasma a day and enough red cells to correct the relative anemia and restore blood volume preoperatively. This is usually attained in three to six days.

WOUND CARE

The postoperative care of the surgical wounds and preservation of a specific repair require treatments that predispose to medical complications, particularly atelectasis, hypostatic pneumonia, and phlebothrombosis and their sequelae. These antagonisms cannot be entirely prevented but can be modified. The successful outcome of a case often depends upon the proper application of bandages. For example, when used for support, the tight abdominal surgical dressing should be applied in a manner that will allow as complete diaphragmatic action as possible. This can be accomplished by proper application and frequent checking to make sure the dressing does not slip up to cover the ribs. The scultetus binder is notorious in this respect, and, as an abdominal support, it is not infrequently applied over the rib cage by inexperienced personnel. In orthopedic and vascular homografts, it is frequently imperative for the patient to remain prone for extended periods. In such cases, massage, restricted passive motion, and properly applied Ace bandages may prevent many complications.

TACHYCARDIA

Tachycardia is usually a sign of an underlying disturbance, but, if it is a bothersome arrhythmia, the condition itself must be treated specifically. Embolization, atelectasis, pneumonitis,

electrolyte imbalance, heart failure, fever, impending shock, and myocardial infarction are perhaps the most common causes of tachycardia in the postoperative period, and treatment is essentially directed at the underlying disturbance.

METABOLIC CONDITIONS

The use of steroids in postoperative management is paramount in Addison's disease, hypopituitarism, bilateral adrenalectomy, unilateral adrenalectomy when that adrenal has been hyperfunctioning, and in conditions in which the adrenal glands have been suppressed by recent steroid therapy.

The steroid requirements are greatly increased for five to seven days after surgery or longer if further stress develops. Galante and associates⁸ feel that steroids should be used if cortisone in excess of 50 mg. per day for five days has been used within two months prior to surgery or if ACTH has been used within five days. Occasional deaths from unrecognized adrenal insufficiency have been recorded months after steroid therapy. These authors recommend a therapeutic scale for postoperative adrenalectomy consisting of progressively decreasing dosages of cortisone over a seven-day period until a maintenance level is reached with an addition of DOCA on the fourth postoperative day. When in doubt, steroids should be used. If the preoperative status is in doubt, a Thorn test may be positive when adrenal function is adequate for normal activity but insufficient in times of stress.⁹ Signs and symptoms of adrenal insufficiency are hypotension, fever, drowsiness, and coma.

Gout, unlike rheumatoid arthritis and osteoarthritis, is made worse by surgery and is frequently diagnosed in the postoperative period. The arthritis usually manifests itself twenty-four to thirty-six hours postoperatively. Uric acid levels and roentgenograms fail to substantiate the diagnosis in half of the cases. According to Bartels,¹⁰ 6 per cent of gout cases diagnosed postoperatively are in women. He also states that oral colchicine is usually contraindicated in the postoperative period and suggests intramuscular ACTH, intravenous colchicine, or, if single joints are involved, intra-articular hydrocortisone.

Warren¹¹ does not believe that acute pancreatitis is a common complication of surgery in the vicinity of the pancreas. This condition usually develops twenty-four to thirty-six hours after surgery and is manifested by apprehension, pain, abdominal distention, decreased or absent bowel

sounds, and epigastric tenderness. If an abscess is present, pus or blood may accumulate in the flanks, and extensive drainage may be required.

Cholangitis is usually the result of obstruction and not reflux as was formerly thought.

With adequate preoperative management, the thyroid crisis is rarely encountered. Hypoparathyroidism, secondary to complete removal of the gland, interference with the blood supply, or removal of a functioning adenoma is usually recognized early and treated by the surgeon.

SURGERY FOR CORONARY ARTERY DISEASE

Etsten¹² feels that only in an emergency should surgery be performed on patients who have had infarcts within three previous months. His incidence of postoperative cardiac deaths in chronic coronary artery disease is 0.8 per cent and, in acute coronary artery disease, 18 per cent. It is felt that the success of the operation is not influenced by the type of anesthesia used. The important factor is smooth induction, as straining, bucking, hypotension, and coughing reduce coronary blood flow and increase the incidence of infarction. Other factors predisposing to complications are the depth of anesthesia, the maintenance of blood pressure, and adequate pulmonary ventilation. Etsten feels that patients over the age of 60 should be treated in the postoperative period as if they had coronary artery disease. Baker¹³ believes that shock and prolonged deep sedation tend to produce cerebral vascular accidents.

POSTOPERATIVE HYPOTENSION

The problems of blood loss and adrenal insufficiency have been discussed. The following list is incomplete but is an attempt to explain those causes of hypotension peculiar to surgery and anesthesia.

Acute gastric dilatation usually develops during those "minor procedures" in which gastric suction is rarely indicated. Four to eight hours postoperatively, the patient, who is often sedated and with no complaints, suddenly goes into shock for no explainable reason. Percussion over the stomach establishes the diagnosis, and gastric suction corrects the condition.

Cyclopropane shock is rarely encountered with the present standards of anesthesiology, and, when it develops, it is quickly remedied and corrected. The mechanism is due to a CO₂ build-up resulting from inadequate pulmonary ventilation. Pure oxygen administered as the patient is coming out of anesthesia drives off the retained CO₂ which, at high levels, stimulates the respirations. For treatment, a mixture of CO₂

and O₂ should be given. The medical counterpart seen in chronic respiratory acidosis is noted after postoperative administration of O₂. In these cases, intermittent O₂ or intermittent positive pressure breathing with compressed air is indicated.

Pain in the recovery period is perhaps the most common cause of postoperative hypotension and is readily alleviated with judicious use of analgesics.

Anoxia, secondary to inadequate pulmonary ventilation, must always be watched for as a possible development. Some chest services do routine six-hour postoperative bronchoscopies on all patients. Local block tracheal suction, moist air, judicious use of sedatives that suppress the cough reflex, tracheotomy, postural drainage, and early ambulation are essential in the treatment of this condition. Also important is the preoperative indoctrination of the patient—teaching him that he must cough and breathe deeply when asked to do so and urging cessation of smoking.

Peritonitis, either infectious or traumatic, can produce large losses of plasma and produce de-

creased blood volume with no changes in red cell mass. It is usually treated with plasma or, if the patient is anemic, with both plasma and blood.

Severe infection, especially streptococcal, staphylococcal, coliform, and clostridial, may produce shock which often requires blood, antibiotics, and surgical drainage. Antibiotics should be given intravenously in these situations.¹⁴ The mechanism of the shock is caused by loss of fluid into inflamed tissue or space and by toxemia with its direct action on the heart and adrenal glands and a direct effect on the erythrocytes, decreasing their ability to transport oxygen.

Perhaps one of the most dramatic causes of postoperative shock is acute enterocolitis. The incidence seems to be highest following gastric surgery, operations on patients with acute enteritis, and after administration of broad spectrum antibiotics. The signs and symptoms are violent diarrhea, vomiting, shock, dehydration, anemia, and death. The mortality rate is very high. In a recent report,¹⁵ 6 of 8 patients died within two days after the condition developed.

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ALL SOLITARY or multiple adenomatous nodular goiters in men, children, and adolescents should be removed because of the high incidence of associated thyroid cancer. In adult women, removal of solitary adenomas is advisable, but resection of multiple adenomatous goiters is not always justified, since the incidence of malignant transformation is low.

Of 879 adenomatous goiters, 3.4 per cent proved to be malignant. In men, 10.5 per cent of multiple adenomas and 14 per cent of solitary adenomas were malignant, as compared with 1.2 and 3.4 per cent, respectively, in women. In patients between 11 and 20 years of age, the incidence of carcinoma was 9.9 per cent.

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Debridement and Panarthrodesis for Spinal Tuberculosis and Simulative Disease

A Preliminary Report

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POSTERIOR FUSION has been a time-honored form of surgical treatment^{1,2} to hold stable those vertebrae involved in Pott's disease of the spine. In the pre-streptomycin days, the surgeon who contemplated debriding or even directly opening a Pott's abscess could usually anticipate secondary infection, possible spread of the tuberculous disease, and chronic drainage.³⁻⁵ Although Treves⁵ first recorded direct surgical debridement for spinal caries in 1884, it was not until the advent of streptomycin in 1947 that this direct surgery became more practicable. By 1952, the effects of streptomycin on bone and joint tuberculosis had been investigated and reported by Bosworth and Wright⁶ and many others. In the United States, Johnson and associates⁷ reported that direct attack of tuberculous spondylitis was safe, and they used this method to aid in differential diagnosis. Meanwhile, Wilkinson,⁸ in England, re-emphasized that a Pott's abscess produced endarterial occlusion at the periphery of the surrounding wall, thus blocking parenteral streptomycin from crossing the interface and entering the cavity. To encourage the antibiotic in reaching the diseased tissue, he did debridement alone of the abscess and wall. Kastert,⁹ in Germany, emptied the abscess, leaving the wall intact as a barrier against spread of the disease and treated the patient postoperatively by local antibiotic instillations through a catheter into the diseased area. Felländer,¹⁰ in Norway, Kirita,¹¹ in Japan, and Sanchis-Olmos,¹² in Spain, all have reported small series of patients in whom they debrided

the abscess and placed bone in the cavity to form a solid fusion. Some of their reported results have been very encouraging.

In January 1953, we began to debride Pott's abscesses and fuse both anteriorly and posteriorly, primarily because the complications, sequelae, and recurrent disease from previous methods of management seemed excessive. Our attention had been drawn to the ease of entering the vertebral body while employing the retroperitoneal approach used by Weinberg^{13,14} for psoas abscess excision, a route in which the approach to the lumbar spine so much resembles that used for nephrectomy.

In our plan of treatment and follow-up care, we have established several well-defined goals. We plan to excise the cavity walls, sequestra, and other debris; try to obtain solid bony fusion between the vertebral bodies and posterior elements across the diseased vertebrae as judged by two anterior posterior and two lateral roentgenograms taken with the patient bending; give adequate chemotherapy for at least one year postoperatively; and await clinical quiescence of the disease and normal laboratory findings. We have tried to make certainty, rather than rapidity, of arrest of the disease our objective. Preliminary bed rest in a plaster jacket and the administration of a combination of streptomycin, para-aminosalicylic acid, and isoniazid are given. Daily streptomycin in a 1 gm. dose is first given for one month, usually prior to and following surgery. The dosage is then reduced to semi-weekly injections of 1 gm. for a year or more. During this interim phase, other foci of tuberculosis are treated by recognized means, including resectional surgery where indicated. When clinical and laboratory signs indicate that the patient has gained sufficient resistance to his disease and the tuberculous process has quieted sufficiently, the vertebral focus is attacked.

In lumbar disease, the incision lies in the flank paralleling the anterior primary divisions of the

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lower thoracic spinal nerves and is the same as the "sympathectomy" approach.¹⁴ Although we have approached the spine from each side, the left side is preferred, wherever there is a choice, because the aorta is less vulnerable than the vena cava. The sympathetic chains lie anterolaterally to the vertebral bodies and, if either one gets in the way, it can be displaced without interruption. In the presence of a large psoas abscess where there is a possibility that anatomic landmarks will be obscured, it is well to insert a ureteral catheter preoperatively. If a psoas abscess is present, it is excised first.^{13,14} Using portable roentgenograms and metal markers if necessary, the abscess in the vertebrae is located and opened. Part of the psoas or diaphragmatic slips of origin may be divided or retracted to expose the diseased vertebral area. The anterolateral vertebral and annular ligaments are incised and reflected sufficiently for good exposure. The debris and sequestra are lifted free, after which the degenerated disk and scar tissue are removed. Next, the sclerotic bony walls are excised, exposing cancellous bone of the adjacent vertebrae (figure 1a). Milled granules of cancellous bank bone are then packed into the cavity. These serve effectively to control bleeding from the raw bone surfaces (figure 1b). Approximating the separated ligamentous or muscle fibers closes the cavity, retaining the bone clips. A drain is used only if a psoas abscess has been removed.

In 2 patients (cases 9 and 10), thoracic intervertebral disk spaces were involved. In case 9, the diseased area was approached retroperitoneally by resecting the twelfth rib. This approach proved rather difficult and awkward, especially for curetting the eleventh thoracic disk space. The eleventh thoracic interspace in case 10 was approached through a transpleural incision with resection of the eighth rib. This proved to be a much easier approach, and it was noted that the twelfth thoracic interspace could have been entered readily. The twelfth patient had disease of his fourth and fifth cervical vertebrae. Approaching the disk space from the side just behind the sternocleidomastoid muscle and in front of the vertebral artery presented no unusual difficulties. The common carotid artery and its accompanying vessels and nerves were retracted forward together with the other adjacent soft structures. Spreading apart a few fibers of the long neck muscles revealed the diseased area.

The patients were nursed postoperatively in a preformed, bivalved body cast, which had bilateral thigh extensions for lumbar areas, and for

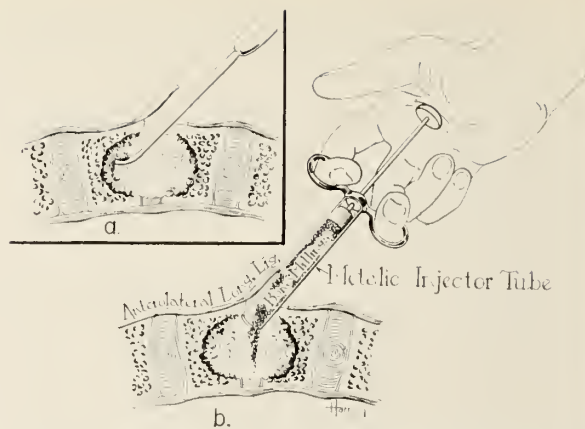


Fig. 1a. Diseased debris and sclerotic walls have been removed. (b). Milled granules are injected and packed into cavity remaining.

low thoracic areas included the shoulders. For our one cervical case, a snug Minerva jacket was used. About two months after the primary interbody debridement and grafting, a Hibbs' type posterior laminar and facet fusion of only the diseased vertebrae was done. Three months after the last operation and at quarterly intervals thereafter, the aforementioned 2 plane roentgenograms were made to help determine solidity of the fused area. When the panarthrodesis was deemed solid, the patient became ambulatory. A brace sometimes was employed, primarily to remind the patient to guard his back until the roentgenograms showed complete consolidation. In our one cervical case, the posterior approach followed the anterior under the same anesthetic. A preliminary tracheotomy was performed as a precautionary measure.

We have used this plan of therapy on 12 patients with suspected tuberculous spines. Two of the patients according to cultures and tissue examination were found to have nontuberculous disease. Three others could not be confirmed or disproved by cultures and tissue examination. The levels of disease in these patients ranged from the fifth cervical through the fifth lumbar interspaces. Three patients had two interspaces involved.

One- to four-year follow-up examinations have been made in all cases. They appear to be solidly fused as judged by 2 plane roentgenograms. However, the anterior grafts do not all show completed bony incorporation, as it sometimes takes two or more years for trabeculation to appear. By our standards, these patients have arrested spine disease.

The complications so far have been largely technical. Abdominal wall weakness and bulging

from the interruption of motor nerves developed postoperatively in 2 patients. In another patient (case 7), the posterior end of his incision started to drain four months after operation. Drainage persisted for five months and ceased spontaneously. Hemolytic *Staphylococcus aureus* organisms were grown on cultures from this drainage as well as from the tissue removed at the surgical debridement.

CASE REPORTS

Case 1. Our first patient was a 30-year-old Caucasian veteran whose back pain began in 1942. He was found to have tuberculous spondylitis of the second, third, and fourth lumbar vertebral bodies. Subsequently, three attempts at fusion of his lumbar posterior elements failed. In January 1953, an operation consisting of a debridement and anterior interbody fusion was done from the second to the fourth lumbar vertebrae. Three months later, the areas of nonunion in the posterior elements seemed bridged solidly by bone. Nine months later, the spine appeared solid in routine 2 plane roentgenograms. The patient now works eight hours daily as a small motor electrician.

Case 2. The second patient was a 32-year-old white minister who first felt back pain in January 1953. Six months later, tuberculous spondylitis of his fifth lumbar and first sacral vertebrae was diagnosed and he was started on our plan of therapy. In July 1953, the fifth lumbar vertebral interspace was curetted and packed with bone chips. In May 1954, a posterior element fusion across this interspace was performed. Seven months later, the spine appeared solid in 2 plane roentgenograms. The patient now works as a full-time salesman.

Case 3. The third patient was a 65-year-old white retired laborer who had pulmonary tuberculosis in 1919 which again became active in 1952. Active disease was also found in his fifth lumbar and first sacral vertebrae. This diseased area was curetted and grafted anteriorly in October 1953. Four months later, the spine appeared solid in 2 plane roentgenograms. He is the only patient in this series who has not had posterior surgical fusion on his spine. However, upon reviewing his postoperative roentgenograms, a solid bony bridge appears to have developed spontaneously between the spinous processes and laminae at the lumbosacral level. The patient is still retired.

Case 4. The fourth patient was a 33-year-old Caucasian cabinet maker who had five years of low-back pain before a working diagnosis of tuberculosis was made in May 1953. During a planned therapeutic program in March 1954, debridement and bone grafting was done at the third lumbar interspace. Tissue sections examined microscopically confirmed the diagnosis of tuberculosis. Three months postoperatively, the spine was judged solid by 2 plane roentgenograms. In September 1954, the same interspace was grafted posteriorly. He is now working and is asymptomatic.

Case 5. The fifth patient was a 34-year-old colored cook who had had pulmonary tuberculosis diagnosed in 1949. Backache started in March 1952. Eight months later, his first and second lumbar vertebrae were found diseased. Destruction progressed, and kyphosis appeared. In August 1954, debridement of the abscess and interbody fusion was done. Tissue sections confirmed the diagnosis of tuberculosis. A posterior element arthrodesis was performed in September 1954. One year later, com-

plete stability was demonstrated. The patient now works full-time in the post office, lifting packages and doing rather heavy work.

Case 6. The sixth patient was a 28-year-old white serviceman who first recalled low-back pain early in 1954. By December, a diagnosis of fourth and fifth lumbar vertebral disease was made and therapy started. In March 1955, anterior curettage and fusion was done, which was followed by posterior arthrodesis in June 1955. The diagnosis of tuberculosis was confirmed by the Pathology Department. Stability was judged complete two months later. He is now ambulating without a brace and is working, but he is not back in the service.

Case 7. The seventh man, a 59-year-old white rancher, hurt his back in a fall in 1953. Pain which originated from the trauma continued, and roentgenograms demonstrated a destructive lesion of his third lumbar body superiorly. The patient had been told as early as 1924 that he had tuberculosis. In 1927, he had left knee pain and swelling, which were later diagnosed from roentgenographic appearances as tuberculous. With continuous casts for five years, the knee joint ankylosed spontaneously. In November 1953, the second lumbar interspace was debrided, and a fusion was performed. Hemolytic *Staphylococcus aureus* was grown from cultures, and tissue sections showed a few areas of chronic inflammatory tissue without pathologic evidence of tuberculosis. Four months after primary healing, a draining sinus developed and continued for five months before closing spontaneously. In September 1954, a posterior arthrodesis was done. Seven months later, both fusions were solid, and the patient was as active in ranch work as he had been before surgery.

Case 8. The eighth patient was a 62-year-old white retired warehouseman who, after many years of back pain, had had a posterior fusion from his eleventh thoracic to his second lumbar vertebrae performed in November 1953. Despite apparent solidity of the fused area, his pain continued. In July 1954, the twelfth thoracic and first lumbar interspaces were curetted. Bone graft material was packed into the region of the first lumbar interspace only, because the twelfth space did not appear diseased upon inspection. In the tissue sections, no typical areas of tuberculosis could be found. Nine months later, the twelfth thoracic and first lumbar interspaces both appeared to be filled with bone. The patient did not work before, nor does he now, but says he feels well insofar as his back is concerned. He complains of a bulge in his abdominal wall at the incisional scar level.

Case 9. The ninth patient was a 34-year-old white television repairman who said he had had severe recurrent midback pains for twenty years. A diagnosis of tuberculous spondylitis of his tenth, eleventh, and twelfth thoracic vertebrae was made in 1945 from serial roentgenogram changes. Posterior fusion from the tenth thoracic to the first lumbar arches was carried out. Because of persistent pain which gradually increased in severity in spite of a solid posterior element bridge, the twelfth thoracic and first lumbar interspaces were debrided and fused anteriorly in February 1955. The tissue removed at operation did not appear tuberculous macroscopically, and cultures failed to grow acid-fast organisms. Chronic nontuberculous inflammatory reaction was observed microscopically in the excised tissue sections. The patient returned to work in July 1955, and his back is comfortable. There is asymptomatic bulging in the left flank at the incisional line.

Case 10. The tenth patient was a 34-year-old construction worker who had had an insidious onset of mid-

back pain in October 1955. A destructive lesion of his eleventh and twelfth dorsal vertebrae with paraspinal soft tissue swelling was seen in a roentgenogram in December 1955. In March 1956, anterior debridement and fusion of the diseased area was accomplished, and, in May, a posterior element arthrodesis was done. Preoperative aspiration material and surgically excised tissue grew *Staphylococcus aureus* on cultures. Microscopic sections showed chronic nonspecific inflammatory tissue with sequestration. His postoperative course was that of progressive uncomplicated healing.

Case 11. The eleventh patient was a 27-year-old colored automobile body assembler who began to have low-back pain in April 1955. This pain subsided only to recur in October and to be complicated by a swelling in his right upper anterior thigh in February 1956. A clinical diagnosis of tuberculosis of his fourth lumbar interspace and the left sacroiliac joint was established. Diseased areas were excised, including a right psoas abscess sac, the fourth lumbar disk and adjacent body surfaces, and the left sacroiliac joint and adjacent bony surfaces. Surgery was carried out in two stages. The first, in April 1956, consisted of psoas abscess excision, debridement, and interbody arthrodesis. The second stage, done in June, consisted of posterior element fusion of the fourth and fifth lumbar arches and, in addition, the debridement plus bone grafts to the left sacroiliac joint. His areas of fusion are solid, and he is clinically asymptomatic.

Case 12. The twelfth patient was a 34-year-old man who had had an ankylosed spine from Marie-Strümpell arthritis for nearly ten years. Without any definite etiologic traumatic episode, some brachial plexus paresthesia and some atrophy of the small muscles in his hands had developed very, very slowly over about two years, and a progressing dislocation of the fourth cervical vertebra forward on the fifth was apparent in the lateral roentgenograms. Although motion was still possible at the first cervical level, the rest of the cervical spine had been fused solidly by his disease process, and the dislocation had developed secondary to some sort of pathology in the fused area. After discontinuing steroid therapy, fixation was accomplished by use of a Minerva jacket. After three months of immobilization, no improvement could be determined objectively, and bending films demonstrated that motion was still present at the level of disease. Accordingly, antituberculous therapy was instituted. In August 1956, a preliminary tracheotomy was followed by an anterior debridement and bone graft, which, in turn, was followed by a posterior Hibbs' type fusion with interspinous process wire fixation. Postoperatively, healing occurred without complications. The sections for microscopic study and cultures taken from tissue removed at surgery have yielded no specific information other than chronic inflammatory disease with necrosis and degeneration. The paresthesia has regressed, and his area of fusion is solid.

DISCUSSION

It has been interesting to note that whenever, as in the first patient, a posterior element fusion failed or was delayed, addition of the anterior interbody fusion was followed by rather rapid arthrodesis of both sites. The reverse was also seen, as in the second patient, when ten months after primary debridement and bone grafting, the interbody space showed no tendency to consolidate. A posterior element fusion then was

followed by fairly rapid consolidation of both sites.

It is also noteworthy that cases 8 and 9 had continuous or recurrent symptoms in spite of a solid posterior element fusion. Both of these patients were completely relieved of their back symptoms after the anterior debridement and panarthrodesis. Cases 7, 8, 9, 10, and 12 again emphasize the fact that spinal disease is not necessarily always tuberculous in origin.

Although we are confident that a certain percentage of these patients would have been all right with a single fusion either anteriorly or posteriorly, nevertheless, we feel the combined surgery is well justified. In the first place, we have never had any increase of vertebral destruction or kyphosis subsequent to surgery. Second, the abscess found at surgery at times has been much larger than was apparent in preoperative roentgenograms. And, finally, we have observed progression of disease activity objectively as well as subjectively in the presence of a solid posterior element fusion—a progression which has ceased only when natural processes have created a solid interbody arthrodesis anteriorly. Thus, we feel we are actually hastening arrest of the disease in many individuals and, at the same time, are assuring arrest in all patients, which is not possible by other methods.

In following the progress of these diseased spines, we have found serial measurements of serum enzyme inhibitor levels¹⁵ to be helpful. The chymotrypsin inhibitor level, elevated in the presence of disease activity, returns to normal when the disease process becomes isolated or controlled by the body processes or when the disease process has been excised surgically. Used in conjunction with the rennin inhibitor level, a pattern is obtained which we have utilized in over-all evaluation of the patients' condition prior to and following surgery. A few times we have found a disturbed pattern to be the only objective evidence of disease.

One of the most gratifying aspects of this treatment is the pronounced postoperative relief which some patients obtain after debridement. Occasionally, their preoperative symptoms have been so severe that their personalities have become altered to a degree that psychoneurosis, malingering, or narcotic addiction has been suspected. Once the diseased tissue has been removed, the personality has frequently improved almost overnight. A few have said they felt better during even the first twenty-four hours postoperatively than in previous months.

The surgery herein described has been undertaken and made possible through the close co-

operation, advice, and assistance from the other surgical specialties. We are not recommending that our surgical program be universally or even generally adopted. We wish to emphasize the great degree of caution necessary when working in close proximity to the great vessels.

SUMMARY

We have presented a preliminary report on the details of our management of destructive, granu-

lomatous, infectious (presumably tuberculous) disease of the spine. The essential surgical contribution is the direct debridement and panarthrodesis of the diseased vertebrae. In our hands thus far, this program has been extremely gratifying with no disease recurrences or re-activations and few complications. This is a preliminary one- to four-year study which we anticipate will be augmented later by more cases followed for longer periods.

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IN INFANTS AND CHILDREN, symptoms of periostitis may simulate paralysis of congenital syphilis or poliomyelitis, but roentgenograms show periosteal reaction. Since periostitis subsides without treatment and rarely leaves residual manifestations even in the roentgenogram, differentiation from more serious skeletal lesions is essential.

Antecedent trauma has often been forgotten, since even slight injury may cause extensive subperiosteal hemorrhage and stripping of the periosteum. The child is reluctant to move the limb and may complain of pain, and the affected area may be swollen and extremely tender.

Roentgenograms made immediately after injury are negative. About a week later, calcification and formation of new subperiosteal bone is evident. The new bone involves only the shaft, never extending beyond the epiphyseal line. The subperiosteal cloaking may appear as a faint line along the shaft or may resemble the massive, calcified subperiosteal hematoma of scurvy. A faint fracture line of epiphyseal displacement is sometimes seen.

Differential diagnosis includes congenital syphilis, poliomyelitis, congenital cortical hyperostosis, osteomyelitis, scurvy, and bone tumor.

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Power Lawn Mowers—A New Hazard

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INJURIES PRODUCED BY rotary-type power lawn mowers may cause loss of life, limb, and eyesight and other permanent disabilities. Such injuries also may be responsible for considerable economic loss to the families involved. There is great need for accident prevention programs and safety education with regard to use of these machines. According to the United States Department of Commerce, 362,249 power lawn mowers were manufactured in the United States in 1947. Last year, approximately 3½ million of them were sold, and the Lawn Mower Institute, trade organization of lawn mower manufacturers, estimates that there are now over 12 million in use.

With the increase in the number of power lawn mowers manufactured and used has come an apparent increase in the number of injuries caused by them.

The most popular type of mower is the gasoline rotary, which is responsible for about all of the serious injuries.

In addition to cutting anything which comes into its path, the revolving blades may pick up and throw with bullet-like force bits of wire, nails, glass, bolts, bones, and so forth. These may strike not only the operator of the machine but someone nearby or across the street. Lethal wounds involving brain, heart, and neck have been reported as well as fatalities from tetanus—secondary to such injuries. Some of the more common type wounds are shown in the accompanying illustrations.

A survey of approximately one-half of the physicians in private practice in Georgia, conducted by the Accident Prevention Unit of the Georgia Department of Public Health, revealed 794 injuries during the years 1955 and 1956. Among the injuries reported, rotary mowers were definitely responsible for 88 per cent, and the reel mowers caused 7.7 per cent. Among all injuries, 70 per cent were caused by direct contact with the mower, and 30 per cent were caused by objects thrown by the mower.

The anatomic regions involved are shown in table 1. Note the relatively high percentage of eye injuries among the missile-type wounds. The study also revealed that complications developed in 9.4 per cent of the wounds, such as infections, thrombophlebitis, pulmonary emboli, and so forth, and that permanent disability of some kind followed in 14 per cent of the cases.

SUMMARY AND CONCLUSIONS

The fact that power lawn mower injuries can cause loss of life, limb, and eyesight and other permanent disabilities has been stressed. The number of such injuries has apparently increased with the widespread use of these machines. There is great need for safety education with regard to the proper operation of the power lawn mower. Also needed is a safety standard to be followed by manufacturers. It would seem reasonable that manufacturers be allowed to sell only machines meeting certain minimum safety standards. The power lawn mower has thus created a great need for an extensive accident prevention program involving manufacturers and sellers as well as users of these machines. Physicians, medical societies, public health departments, safety organizations, and local and national insurance companies should be responsible for the development of this kind of a program. The institution of such a campaign offers a challenging opportunity for those interested in accident prevention.



Fig. 1. Wound of right globe by rock thrown by rotary power mower. Enucleation necessary. Courtesy Dr. Morgan Raiford.

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TABLE 1
REGIONS OF BODY INVOLVED

	<i>Number</i>	<i>Per cent</i>
Injured by direct contact with mower:		
Toes or feet	366	66
Fingers or hand	143	26
Other areas	44	8
Total	553	100
Injured by objects thrown by mower:		
Lower extremities	167	69
Trunk	6	3
Upper extremities	12	5
Head and neck (excluding eyes)	17	7
Eyes	39	16
Total	241	100



Fig. 2. Division of Achilles tendon, posterior tibial vessel and nerves, and laceration of tibia by rotary mower.



Fig. 3. Amputation of 2nd, 3rd, and 4th toes and tip of great toe by rotary mower.



Fig. 4. Loss of end of middle finger and laceration of tip of ring finger by direct contact with rotary mower.



Fig. 5. Short piece of wire thrown by rotary mower deep into leg. Courtesy of Dr. Jack Schreeder.



Fig. 6. Heavy wire driven in and out the foot by rotary mower.

The Prevalence and Incidence of Multiple Sclerosis in Missoula County, Montana

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SOME OF THE STAFF NEUROLOGISTS at the Mayo Clinic have had the impression that a relatively larger number of patients with multiple sclerosis are being referred to the clinic from the Montana-Idaho area than from other parts of the country. This impression was conveyed to us, and a study of the prevalence and incidence of multiple sclerosis in Missoula, Montana, was undertaken. Missoula was chosen for this statistical survey because of its central location in this northwestern area, its convenient size, and the high level of local medical practice. Two similar studies in small northern cities were referred to for comparison.^{1,2}

If it had been found that multiple sclerosis is significantly more prevalent in Missoula than in other northern cities previously studied, an intensive epidemiologic investigation was planned in an attempt to discover important local factors which might account for this difference.

METHODS

The locality. Missoula, Montana, is situated in the far west-central part of the state and is 205 miles east of Spokane, Washington. The altitude of the city is 3,223 ft. In planning this study, it was decided to restrict the population investigated to those living within Missoula County. Missoula County represents an area of 2,640 square miles, and the estimated population in 1956 was 42,600. Approximately 70 per cent of the population lives in the city of Missoula, and all of the physicians practicing in Missoula County have their offices in the city of Missoula.

Case finding. A number of sources of medical information were surveyed in attempting to lo-

cate all patients who had been diagnosed or were suspected of having multiple sclerosis. All of the Missoula physicians and several from surrounding counties were contacted personally, and information on patients living in the county was requested. Several neurologists from other areas to whom Missoula County patients were often referred were asked for similar information. A list of patients was obtained from the Missoula chapter of the National Multiple Sclerosis Society. Case records from a local Veterans Administration Hospital were reviewed. A physician in Helena, Montana, who has multiple sclerosis himself, offered additional material.

Diagnostic categories. Following neurologic examination in most instances and a review of detailed clinical reports in a few, patients were classified as (1) probable, (2) possible, and (3) not cases of multiple sclerosis. The criteria for this classification follows:

(1). Probable multiple sclerosis pertained to patients with neurologic signs and symptoms characterized by exacerbations and remissions or by slow progression of lesions. In all cases, objective documented neurologic findings were explainable only by the assumption of multiple lesions in the central nervous system. Historic evidence, laboratory findings, and examination results supported the impression of multiple sclerosis and were against other diagnoses.

(2). Possible multiple sclerosis included patients who, in most cases, had insufficient evidence of multiple lesions in the central nervous system on the basis of neurologic examination.

(3). Not multiple sclerosis represented those for whom another diagnosis was more likely.

Only probable cases were counted in computing the incidence and prevalence rates.

Determining rates. When the number of patients living in the county on the arbitrarily chosen date of January 1, 1957, was determined, the prevalence rate was calculated on the basis of the estimated population figures for the county on that date. If a patient had moved to Mis-

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soula County before January 1, 1957, to facilitate medical or nursing care, this case was excluded. Likewise, if a patient left Missoula County prior to that date for treatment or nursing care elsewhere, this case was included. There was 1 case in the first and 2 cases in the latter category.

The average annual incidence was calculated on the basis of the average yearly number of patients who had the onset of their disease while living in the county between 1940 and 1950. The average of the population figures for these two years was used in determining the rate. Problems of mortality reporting and the small size of the population group studied made the determination of a mortality rate impractical. However, an average annual mortality rate for Montana for the years 1950 through 1954 was calculated for comparison with the average United States rate for this period.

RESULTS

Information was obtained on 38 patients suspected of having multiple sclerosis who were living in or had lived in Missoula County. Of these, 29 were interviewed and examined. Sufficient preliminary information was available from 3 of the remaining 9 patients to determine that they were ineligible. Three patients were not examined at the time of the study but were included in the frequency figures on the basis of records submitted by other physicians and

TABLE 1
CLASSIFICATION OF 38 MULTIPLE SCLEROSIS SUSPECTS

	<i>Patients examined</i>	<i>Patients not examined</i>	<i>Total</i>
Probable M S eligible for study	22	3	25
Probable M S ineligible for study	1	3	4
Possible M S	3	1	4
Not M S	3	—	3
Insufficient information	—	2	2
Total	29	9	38

information obtained from the patients. Table 1 shows the final result of the classification.

Prevalence rate. Of the 29 patients examined, 23 were classified as probable cases, and, of these, 22 were eligible for the prevalence figure. With the addition of the 3 patients mentioned previously, who were classified as probable cases though not examined by us, the total of 25 probable cases fulfilling the criteria for the prevalence data gives a rate of 59 per 100,000 based on the estimated county population of 42,600 on January 1, 1957. This rate compares closely to rates obtained in the Rochester, Minnesota, and the Kingston, Ontario, studies (table 2).

Incidence rate. Six patients with probable multiple sclerosis were found in whom onset of their disease occurred between 1940 and 1950 while living in Missoula County. The calculated annual incidence rate is 1.9 per 100,000 persons and is based on the average of the population census figures for 1940 and 1950. If 2 county residents are included who had the onset of symptoms during this period but while in the Service, the rate becomes 2.5 per 100,000. These rates are noted to be in the range of those reported in studies of other northern cities: Boston 2.6, Winnipeg 2.2, and Denver 2.2.³

Mortality rate. The average annual reported mortality rate for Montana for the years 1950 through 1954 is 1.3 per 100,000 persons, and the corresponding rate for the United States is 1.0. This degree of excess over the national average rate was consistently observed in rates determined for other northern states.³

Case material. Several features characterizing this group of patients are presented. The women to men ratio was 18:7. The average age at onset in the women was 29.3 years, and the average duration of the disease at the time of the study was 22.0 years; whereas, in the men, the average age at onset was 36.1, and the average duration was 14.9 years. It is realized that these data from a study of living patients are biased in favor of a longer duration of the disease and should not be used alone in predicting life expectancy. Extreme variation in the severity and

TABLE 2
RECENT STUDIES OF THE PREVALENCE OF MULTIPLE SCLEROSIS IN NORTH AMERICAN CITIES

<i>City and date of study</i>	<i>Population at time of study</i>	<i>Mean temperatures</i>		<i>Latitude North</i>	<i>Prevalence rate per 100,000 population</i>
		<i>January</i>	<i>July</i>		
Rochester, 1948 ¹	33,000	14	72	44	64
Kingston, 1949 ²	30,000	16	69	44	53
Missoula Co., 1958	42,600	19	68	47	59

course of the disease was noted. Two familial cases were reported — 1 in a sister and 1 in a cousin. A history of allergic sensitivity was obtained from one-third of the patients. Of a total of 271 persons, including patients, children of patients, siblings, parents, aunts, uncles, and grandparents, rheumatic fever or rheumatic heart disease was known in only 3 individuals. Patients reported no suggestive pattern of personal intolerance to extremes of weather prior to the onset of their symptoms. Many complained that currently extremes of either hot or cold weather aggravated their symptoms or increased their degree of disability.

DISCUSSION

Comparisons of the frequency of a disease in different populations provide information about the natural history of the disease which may help clarify etiology. The frequency may be expressed in several ways. The prevalence refers to the number of persons having the disease at a particular time, and the incidence and mortality represent the number of persons who experience the onset or die from the disease within a given period of time. These figures are more useful in making comparisons when expressed as rates — usually as cases per 100,000 population. Because of underreporting on death certificates and the fact that some patients with multiple sclerosis do not die from this cause, mortality rates derived from death certificates are likely to be deficient. Valid incidence rates are difficult to obtain because of the characteristic insidious onset of this disease, with the resulting difficulty in determining dates of onset. For these reasons, and providing population mobility is slight, the prevalence rate is thought to be the best estimate of the impact of multiple sclerosis on a population.

A number of recent studies have provided data on the incidence and prevalence of multiple sclerosis in several North American cities. These studies have added support to the impression that the prevalence of multiple sclerosis is consistently higher in northern temperate zones than in subtropical areas and that the frequency of this disease within these temperature zones is fairly uniform. Foreign studies, such as those

of Allison and Millar⁴ in northern Ireland and Hyllested in Denmark,⁵ have provided prevalence rates which compare well with figures obtained in studies in northern United States and southern Canada. Within northern Ireland and all of Denmark, these authors found no local areas with an undue number of cases. Kurland and associates found in comparable studies that the prevalence of multiple sclerosis in Winnipeg, Boston, and Denver appears to be in the order of 3 to 6 times greater than in Charleston, South Carolina, and New Orleans, Louisiana.^{3,6,7}

SUMMARY AND CONCLUSIONS

A study of the frequency of multiple sclerosis was undertaken in Missoula County, Montana, to determine whether the clinical impression that multiple sclerosis was unduly prevalent in this area was valid. A further intensive epidemiologic study would have followed if the frequency rates had been found to exceed the rates obtained in similar studies of populations living in a northern climate. The prevalence rate found in this study of 59 per 100,000 population is surprisingly similar to those of 64 and 53 per 100,000 found in the Rochester, Minnesota, and Kingston, Ontario, studies. These 3 studies are believed to be quite comparable in that they dealt with small populations, followed similar methods, and equally thorough attempts were made to locate all patients in the community. An average annual incidence rate for Missoula County was determined, and this is in line with rates for other cities of comparable climate.

It is concluded that the prevalence and incidence of multiple sclerosis in Missoula County, Montana, as determined in this study, are consistent with the pattern of rather uniform frequency rates for this disease in widely separated populations living in comparable regions of climate in the temperate zone of North America.

ACKNOWLEDGMENT

The clinical impression on the incidence of multiple sclerosis in Montana was derived from discussions with Drs. Donald W. Mulder and Henry W. Woltman of the Mayo Clinic. The authors are grateful for their advice. The Missoula Chapter of the National Multiple Sclerosis Society assisted in arranging patient interviews. Drs. James E. McIntosh and H. Ryle Lewis helped in the clinical evaluation of some of the patients.

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Colfax Tornado Disaster

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Colfax, Wisconsin

IT WAS 7:00 P.M., June 4, 1958, when our quiet, peaceful village of 1,000 inhabitants was struck with one of the most devastating tornadoes ever to have hit this part of the country.

Twelve people were killed instantly; about 60 suffered severe injuries and were hospitalized; and another 50 suffered minor injuries, bruises, lacerations, shock, and so forth. The entire village and community were stunned.

About one-third of the homes in the village were destroyed, and many farm sites in the surrounding area were completely demolished.

High tension lines were knocked down, so, of necessity, the power was shut off. Telephone service was out. Our village receives its water supply from a deep well from which it is pumped into a tank. As several water pipes were broken, we also lost our water supply. We were, therefore, without lights, water, and telephone service for the next six or eight crucial hours.

Since I am the only doctor in the village, the survivors naturally came running to me to help the injured. After briefly reviewing the situation, we decided we must have some central station where we could give temporary first aid to the victims. Although I have a large office, I realized it was too small, so it was decided to use the village auditorium basement. The village police officer was contacted, and he, with a number of volunteer helpers, were to bring the injured to the place designated. A number of cots were brought in, and I brought a large supply of first-aid material from my office, such as cotton, gauze, adhesive, splints, bandages, antiseptics, morphine, Demerol, and tetanus antitoxin together with needles and syringes that I keep sterilized at all times. My wife, who is a graduate nurse, several volunteer workers, and I were all ready for the patients as they arrived. We used flashlights at first, but soon someone brought a gas lantern, which served very well.

At this point, I should like to take you back a few years. In 1942 and 1943, it was my patriotic duty and privilege to give a number of Red Cross first-aid courses, both elementary and ad-

vanced, as part of the Civil Defense Program. Although we had more or less forgotten about first-aid and civil defense, on the evening of June 4, our first-aid courses proved invaluable. It so happened that many of the rescue workers who helped the injured out of their ruins and brought them into our first-aid station had either taken our first-aid courses or had received such training while in the service. Those men and women did a wonderful job. No simple fracture was compounded, and, although 1 patient had 3 and another 2 broken vertebrae, no paralysis or injury to the spinal cord resulted.

We have no hospital at Colfax, so those more severely injured had to be transported to hospitals at Eau Claire, Menomonie, or Chippewa Falls—all about 20 miles away. We have only 1 ambulance in town, but, fortunately, our police car is equipped with a radio-telephone, so messages could be sent to various nearby towns for ambulances, station wagons, nurses, and doctors.

Our first victims happened to have severe lacerations, but they were able to sit up and be sent to hospitals in cars. By the time the fracture cases and those more severely injured arrived, we had plenty of ambulances and station wagons.

The following is an approximate summary of the different types of injuries:

About 40 cases of severe lacerations and body bruises.

One crushed foot, requiring amputation of the toes.

One crushed heel.

One fractured tibia.

Three patients with 1 arm broken (radius and ulna).

One patient with both arms broken (radius and ulna).

One badly comminuted fracture at the distal end of the humerus into the elbow joint.

One fracture of the proximal end of the humerus and injury into the shoulder joint.

One fracture of the third metatarsal.

Ten patients with several broken ribs.

One patient with very severe lacerations of both legs, medially and posteriorly, in whom gas gangrene later developed, but who is recovering.

About 40 patients had minor lacerations, body bruises, or were simply in shock.

PERSONAL INTEREST STORIES

Two elderly women, aged 55 and 67, were thrown about 400 feet through the air, and, besides suffering body bruises, one had only a

O. M. FELLAND is a physician and surgeon in Colfax, Wisconsin, and is the only doctor in town.



Photographs picturing the devastation wrought by the Colfax tornado.

broken arm and the other had a compression fracture of 2 vertebrae. Another elderly couple rode through the air on the floor of their house and landed in their neighbor's back yard about a block away. The man suffered only a transverse fracture of the fifth metatarsal in addition to a few lacerations on the face and extremities, and his wife sustained only a broken arm besides a few body bruises and lacerations. One young lady was thrown up into a tree from where she was rescued and suffered only a laceration which required 6 or 7 sutures.

It was clearly evident that we could give only the most necessary first-aid measures, as, in the first place, we were handicapped without lights or water, and, in the second place, I was the only doctor in town during the first hour. However, the following is a brief summary of the procedures we tried to carry out:

1. Lacerations were treated with liberal amounts of antiseptics and were dressed and bandaged. Bleeding was stopped for the most part with compression dressings.

2. Fractures were splinted with temporary splints and adhesive.

3. Those in much pain were given morphine or Demerol and tagged accordingly.

4. We decided that patients who were to be hospitalized had best receive their tetanus antitoxin and toxoid there, so any reaction they might have could be observed.

5. As we had no water or light, no attempt was made to suture any wounds. Those who did not go to the hospital, but were in need of such care, came in the following day for treatment.

We were very fortunate, because, in spite of conditions, no one seemed at all excited. Everything proceeded just like clockwork. We had all the severely injured cases in or on their way to the hospitals within an hour and one-

half. We are indeed indebted to the various hospitals at Eau Claire, Menomonie, and Chippewa Falls and to the doctors who labored throughout most of the night as well as to the ambulances and station wagons that arrived so promptly and also to Drs. Clauson, Murphy, and Asplund of Bloomer, who gave their assistance at our first-aid station.

As I write this, two weeks have passed since our disaster, and only about a dozen patients are still in the hospitals, and these, I think, will make good recoveries.

We are also indebted to the National Guard, who arrived by midnight, to safeguard our village and community from curiosity seekers and looters. The national Red Cross was here the following morning and is still here doing a wonderful job in health and rehabilitation.

From my small experience in this type of work, I believe there are certain conditions which are very desirable in case of such emergencies, and I would recommend the following:

1. Have a central place equipped with the necessary cots, stretchers, blankets, and so forth, where all the injured can be taken.

2. Have efficient help trained and ready for such emergencies, and see that each person, or group, has a specified, prearranged job to do.

3. Have plenty of first-aid supplies on hand at the doctor's office or at the first-aid station.

4. Have on hand emergency lighting facilities—lanterns at least.

5. Have a water supply available that is independent of the regular city water. In our case, one of my sons brought in water pumped from a well on the other side of town.

6. Perhaps the most important equipment that every little village should have is a radio-telephone, such as our police car has, in order to contact surrounding communities for help.



Edward E. Novak, M.D.

*Pioneer Doctor, Educator, Financier,
and Animal Husbandry Expert*

J. ARTHUR MYERS, M.D.

E. E. NOVAK was born April 29, 1873, in Johnson County near Iowa City. He attended rural school and graduated from the Iowa City Academy in 1892. He received the degree of Doctor of Medicine from the University of Iowa in 1895, and the same year began the practice of medicine in New Prague, Minnesota, which he has continued for the past sixty-three years.

Through all of these years, he has rendered excellent medical service to the citizens of New Prague and the surrounding countryside. He has delivered thousands of babies, many of whom are now in the upper age brackets of life. He has brought large numbers of people of all ages through serious illnesses. He has brought comfort to many families by relieving the suffering of those in the family with incurable conditions. He has always been quick to adopt preventive measures of proved value, such as immunization for diphtheria and smallpox.

Dr. Novak is so modest that it was difficult to obtain the desired information concerning his activities and contributions for this biographic sketch. Therefore, correspondence was not effective. However, this problem was solved when a dinner was arranged at the home of Mr. and Mrs. C. W. Loufek, his sister and brother-in-law, in Minneapolis on May 30, 1956. Following the dinner, three of his close friends engaged him in conversation by asking numerous questions about his life and work. To these he responded freely. After more than two hours of conversation, which we always directed back to his work, he was informed that one of these friends, Dr. Charles E. Proshek, had a tape recorder in continuous operation. He then had the opportunity of listening to the record and permission was given to use as much of the information as space

would permit. This record contains so much valuable information, historically and otherwise, that it has been suggested that it be presented to the State Historical Society.

Dr. Novak is a firm believer in providing the best possible educational facilities and has devoted a tremendous amount of time to schools and school children. He was a member of the New Prague Board of Education for forty-four years and was its president from 1920 to 1951. He was president of the Five Town County School Board Associations for five years and president of the Minnesota State School Board Association from 1935 to 1936. He received the Distinguished Service Award of the Minnesota Education, National School Service Institute in 1944.

He was "father" of Minnesota's income tax law, earmarking income tax funds for school purposes.

He is a lifetime supporter of higher education and has rendered valuable service to the University of Minnesota by serving as a member of its Board of Regents from 1937 to 1955.

His activities in local civic affairs were cause for election to mayor of New Prague for two terms at the turn of the century. From 1917 to 1919, he was president of the New Prague Lincoln Club and, from 1919 to 1924, president of the New Prague Community Club.

In 1930, he was LeSueur County Democratic chairman and Democratic presidential elector in 1932. Four years later, he was drafted as candidate for Democratic nomination for governor of Minnesota.

He is a founder (1903) and a former vice president of the First National Bank of New Prague and has been president of the State Bank of New Prague since 1936.

Having been reared on a farm in Iowa, Dr. Novak has much firsthand information concerning agriculture and, particularly, animal husbandry. In 1950, he published an article in which he stated that the livestock industry loses \$100,000,000 annually because of animals that are infected with brucellosis. He pointed out that 5 to 8 per cent of the cattle in the United States were infected with this disease, and it was estimated that 10 per cent of the American people show evidence of brucellosis infection. It was estimated that for every clinical case diagnosed, there were at least 8 to 10 non-clinical or mild cases never correctly diagnosed. In this most enlightening article, he called attention to the great destruction caused by brucellosis not only in animals but also in man and gave the most detailed diagnostic procedures and prophylactic measures. He paid tribute to the fine work that was developed and carried through at the University of Minnesota. His article ended with the following: "The writer is sincerely convinced that what was accomplished in eradicating tuberculosis in our cattle through area testing and slaughter can, with similar methods, be achieved in eradicating brucellosis."

He was a founder of the New Prague Creamery Association of which he was president from 1912 to 1926. At the local creamery, he arranged for the Bang Ring Test, which revealed that 34 per cent of the dairy herds of the area served had brucellosis. Without methods to eradicate the disease at that time, he labored long to have pasteurization introduced before he succeeded.

There is no doubt that the role Dr. Novak played in the fight against brucellosis in cattle and human beings contributed mightily to the rapid control of the disease, so that, by 1954, Minnesota was one of the three states to have reduced brucellosis in cattle to 1 per cent or less and, thus, receive the classification of Modified-Certified Brucellosis-Free state.

Dr. Novak was an intimate friend and firm supporter of the work of Charles E. Cotton, who participated in the first testing of cattle with tuberculin in this country in 1892. Dr. Cotton administered the tuberculin test to numerous cattle in the vicinity of Minneapolis in 1893 and 1894 and was influential in having the first ordinance in the world passed regulating the production of milk within the limits of a municipality. This was in 1895, the year Dr. Novak began to practice in New Prague. Immediately, Dr. Novak came to Dr. Cotton's assistance and helped to promote tuberculin testing everywhere, so Minnesota received the rating Modified-Accredited Tuberculosis-Free area in December 1934. This permitted $\frac{1}{2}$ of 1 per cent of reactor animals in an area at any testing. Therefore, much remained to be done after the state was modified-accredited before the eradication goal could be reached. From 1934 to the present, Dr. Novak has continued to promote periodic tuberculin testing of cattle. The eradication goal is not quite attained, but now the testing of 5,000 cattle is required to find 1 reactor in Minnesota.

On June 28, 1956, Dr. Novak wrote: "I always admired Dr. Cotton very much. He was a great inspiration to me in helping his cause wherever an opportunity presented itself. Well do I remember some of the local as well as state meetings where health problems were considered—especially tuberculosis and brucellosis. Many a time the decision was in the balance, and he called for assistance from the human side of problems, and it was a great pleasure and privilege to try to explain the need to eradicate tuberculosis and Bang's bacillus, both being the source of infection of humans.

"As a boy on the farm I was the 'doctor' for the animals on my father's farm, and I suppose that is why my mother and older brothers thought it proper for me to study medicine. So I took their advice." Since childhood, Dr. Novak has been interested in purebred cattle and thoroughbred horses. He is owner of the Redvue Farms at New Prague, where he has produced large numbers of purebred Red Polled cattle, many of which have won coveted national honors, including 3 National Grand Champion Sires. He has long been an active member of the Red Polled Cattle Club of America, which he served as president from 1932 to 1952. In 1952, this organization's Distinguished Service Award was bestowed upon him.

He was a founder of the Southern Minnesota Livestock Show and president from 1922 to 1938. He instituted and promoted this show to convince farmers of the value of replacing their grade animals with purebred stock. Dr. Novak saved a group of buildings from being wrecked by gaining possession of the property by paying the delinquent taxes of a bankrupt machine factory. He then turned this property over to the Southern Minnesota Livestock Show for housing facilities. When the livestock show was discontinued because of economic conditions in 1941, these housing facilities became the home of the Minnesota Valley Breeders Association. He takes pride in having helped to organize this association, since it is the second largest organization of its kind in the United States. It is doing fine research in the field of artificial insemination and also in pointing the way for easier and better ways of caring for and feeding livestock.

In 1895, when Dr. Novak located at New Prague, the population of the village was 700. There was no telephone. Like Dr. Novak, the townspeople did not work by the clock but until the job was done. The few farmers in the vicinity had to clear the land largely with hand saws, axes, and grubbing hoes. Little by little the cleared, fertile soil produced wonderful crops. Having been reared on a farm in Iowa, where such clearing of land was not necessary, Dr. Novak was well-informed on the most modern methods in successful agriculture. He demonstrated these methods on his own farm, which, at first, seemed ridiculous to other New Prague pioneer farmers, but they gradually realized that his rotation of crops, including the growing of alfalfa, and his practice of raising only purebred animals and

keeping them free from such diseases as tuberculosis and brucellosis by having them tested two or three times each year were far more economical than the methods they employed. Thus, he taught the entire countryside the best methods in agriculture of the day. His influence among the farmers, no doubt, was largely responsible for the area's development of such a fine record in crop growing and animal husbandry. Indeed, it was Dr. Novak who, as an individual farmer, shipped to market the first carload of hogs from New Prague.

In those pioneer days, the practice of medicine was difficult from the standpoint of transportation and the sparse population in the country. Dr. Novak walked to make many calls among the villagers. In the summer, he rode a bicycle. After practicing about two years in New Prague, he found the need of better transportation facilities. He went back to Iowa, and his father gave him a Hambletonian colt. "Good horses and equipment made rural practice a pleasure." In the winter, he drove horses hitched to wagons, sleighs, sleds, buggies, and, not infrequently, he traveled on horseback. He was always ahead of his time as manifested in so many ways, one being that he owned the first automobile in New Prague in order to respond more promptly to the calls of patients.

Epidemics, including smallpox, scarlet fever, diphtheria, and other communicable diseases were frequent in the beginning of his practice. Diphtheria antitoxin was not available for several years. As soon as diphtheria immunization was considered effective and practical, Dr. Novak led the campaign for immunization in the schools. He has always firmly believed and taught that physicians should do work involving the health of the public gratis or at a minimum cost in order that all may benefit.

Tuberculosis was a terrible scourge in Minnesota in 1895. That year the mortality rate was 110.6 per 100,000; 1,693 people died. He saw the rate rise to 119.7, when 2,522 deaths occurred in 1911. Dr. Novak continues to be a potent force against this disease. He has advocated and promoted tuberculosis eradication programs in the schools through tuberculin testing, isolation of contagious cases, and dissemination of information among people everywhere. He is a versatile speaker, well-informed before he speaks and always manifests the courage of his convictions. He played an important role in decreasing the tuberculosis mortality rate to 3.1, when only 101 died in 1957.

The medicine he has practiced has always been the best at the time. "I tried to cultivate in our community the need of a hospital as I soon recognized the need of such an institution. In 1906, I

tried to get financial aid to build a small hospital but did not succeed. Later, I secured four additional rooms over the Remes' Drug Store, where my office was then located, and equipped them as operating rooms, etc., with two beds. This served us quite well for ordinary surgical cases up to about 1932. At this time, Mr. Harvey, one of the officers of the International Milling Company, moved to Minneapolis, and we inherited his fine residence as a community hospital, which served us well indeed until our present Memorial Community Hospital was built."

Not only is Dr. Novak a constant reader of medical books and journals, but he attends medical meetings regularly. He takes an active part in the medical organizations to which he belongs, such as county, state, and American medical associations.

Dr. Novak speaks of the two "vacations" he has had in sixty-three years of practice. These were for six months each, one in 1913 and the other in 1932, but most of the time was spent attending clinics at the University of Prague, Czechoslovakia. In April 1958, he went to Rio de Janeiro, Brazil, where his daughter and her husband are representatives of the United States government in the radio field.

He has been a staff member of the Community Memorial Hospital in New Prague since 1924 and of the Valley View Hospital at Jordan, Minnesota, since 1952. His contributions have been so great and have extended over so many years that the Minnesota Medical Association named him Minnesota Physician of the Year in 1954.

When he had practiced in New Prague for fifty years, a testimonial banquet was given for him on April 29, 1945. It appeared that the entire community of New Prague and surrounding country had arrived for the banquet and program which followed. Many who arrived could not be accommodated for lack of space. That day a fine editorial appeared in the Minneapolis Star entitled "Country Doctor." After relating his numerous activities and contributions, the editorial concluded as follows: ". . . but New Prague probably reveres him most as a country doctor—the man who has come at many calls to deliver babies and see oldsters out of this world. This evening his neighbors are gathering at a dinner to celebrate the fiftieth anniversary of his arrival in New Prague. They hope his shingle will swing in the wind of southern Minnesota for decades more."

At the age of 85, Dr. Novak continues to practice most modern medicine, not only in his office but also in homes and hospitals. In addition, his counsel is sought in such fields as agriculture, education, banking, and, best of all, as a close, personal, true friend.

Surgical Repair of Incomplete Cleft Lips

THADDEUS J. LITZOW, M.D.
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Fig. 1. The Le Mesurier procedure.



Fig. 2a and b. Previously repaired left cleft lip. The patient sought correction of the nasal and lip deformities. (c and d). Appearance after rhinoplasty for nasal deformity and repair of upper lip as discussed in text. Upper lip has been lengthened.

THE LE MESURIER¹ OPERATION has been generally accepted as an excellent procedure for the repair of unilateral complete clefts of the lip. By the use of a quadrangular flap (figure 1), it corrects the objectionable straight-line scar of older methods (figure 2a). The quadrangular flap restores the cupid's bow and the natural pout of the lower portion of the upper lip. Last, the procedure corrects the congenital shortness of the cleft side of the lip. Older methods frequently failed to achieve these advantages of the Le Mesurier procedure.

The most prominent deformity of an incomplete cleft lip is the notching of the lower portion of the upper lip. Closer inspection usually reveals a vertical groove on the skin surface extending from the vertex of the notch into the base of the nostril on the same side (figure 3a). This groove represents a failure of normal development of the underlying mesodermal structures and is manifested by a deficiency of the muscular structures of the upper lip in this region. The lip on the cleft side is also shorter as compared to the normal length of the lip on the

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This department of THE JOURNAL-LANCET is devoted to reports on cases in which all the appropriate diagnostic criteria have been employed, the best known treatment administered and the results recorded. It is desired that these case reports be so prepared that they may be read with profit by physicians in general practice, hospital residents and interns and may be of considerable value to junior and senior students of medicine. This department welcomes such reports from individuals or groups of physicians who have suitable cases which they desire to present.

unaffected side. The nose on the same side of the cleft is deformed by widening of the nostril and flaring of the ala. An acceptable surgical plan for closure of this type of cleft must include correction of the entire deformity of the lip and nostril (figure 3b).

The Le Mesurier procedure, as outlined for complete cleft lips, is not directly applicable to incomplete clefts, especially the smaller clefts. Modification of this procedure, as outlined by Brauer² in 1953, has been satisfactorily applied to our cases of primary incomplete cleft lips and secondary repair of cleft lips (figure 4). This method also avoids the straight-line scar and gives the needed additional length to the cleft side of the lip. Again, the quadrangular flap restores the cupid's bow and the natural pout of the lower portion of the upper lip (figure 5). The method can be applied equally well to the primary repair of small clefts in adults, as seen in figure 3.

Patients seeking secondary repair of operated cleft lips usually have an unsightly linear scar with notching and shortness of the lip.

The patient seen in figure 2 requested correction of his nasal deformity and improvement of his lip if it were feasible. The nose was corrected as shown in figure 2c and d. The notching associated with the vertical scar and the shortening of the lip were then corrected by the method under discussion.

A modification of the Le Mesurier procedure encompassing the advantages of the original plan has been successfully applied to the primary repair of incomplete clefts and secondary correction of unsightly repaired cleft lips.

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Fig. 3a. Primary incomplete left cleft lip in an adult. (b). Early postoperative result. Sutures had been removed the previous day.

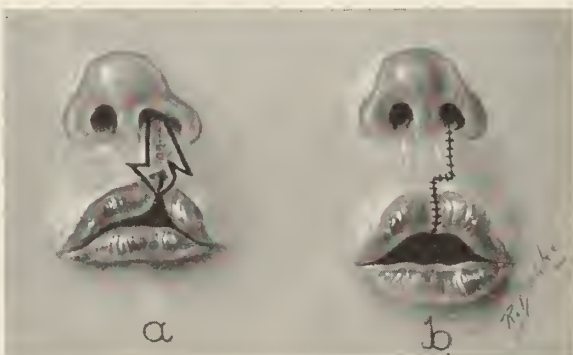


Fig. 4. Modification of the Le Mesurier procedure for incomplete cleft lip.

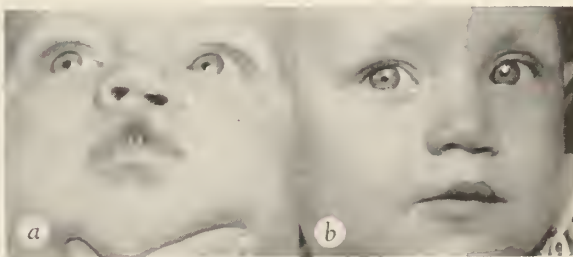


Fig. 5a. Incomplete left cleft lip with associated nasal deformity. (b). Appearance five months after operation.

High Arterial Pressure, by F. H. SMIRK, 1958. Springfield, Illinois: Charles C Thomas. \$15.00.

This volume consists of 764 pages with a generous bibliography at the end of each chapter. The author appears to cover well the physiologic, pharmacologic, and experimental aspects of the subject as well as the basic clinical entities of hypertension. Thus, endocrine, renal, and psychosomatic factors are included. Drugs, past and present, are discussed under therapy, and there are 277 references to hypotensive drugs which are classified chiefly as of academic interest. Consideration of the pharmacology of ganglion blocking agents, including hexamethonium and pentamethonium, is followed by an extensive discussion of the treatment of patients with such agents and with other combinations, including the Rauwolfia compounds. This book will be a valuable addition to the internist's library or to that of any physician interested in the blood pressure problem.

C. A. MCKINLAY, M.D.

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The Atomic Age and Our Biological Future, by H. V. BRONSTEDT, 1957. New York: Philosophical Library, 80 pages. \$2.75.

The purpose of this book is to discuss in a simple manner the effects of radiation on man. The author's principal concern is with the possible effects of atomic energy on man's genetic constitution.

After a discussion of the physics of radiant energy and of the constitution of cells, the author presents a factual and interesting picture of the interaction of radiation and matter. His model of living cells as 1 kilometer diameter spheres containing colored marbles (atoms) and knotted ropes (genes in chromosomes) will assist the uninitiated in understanding how some of the effects of radiation take place.

The author's terminology may be questioned in several instances. He refers to millicuries of radioactivity in terms of "energy" liberated and defines the roentgen unit as "strength" or "energy" of radiation. Strictly speaking, both of these units are measurements of quantity only. He also misuses the term "power" where "force" is actually implied. In chapter 4, the discussion of maximum permissible dose is not in accordance with the present recommendations of the International Committee on Radiation



Protection (ICRP). It recommends that occupational exposure of individuals be restricted to an average of 5 rem (or roentgens) per year, and that the exposure of the general population should on the average be less than one-tenth of this amount. Brondsted states in Chapter 6 that the approximate exposure from radiocopy (fluorocopy) is 30 r. per minute. This might be true in Denmark, but, except for isolated instances, comparable machines in this country are restricted to deliver less than 10 r. per minute in accordance with the National Bureau of Standards *Handbook 60* on "X-ray Protection." Also, the author's sweeping statement that further hydrogen bomb testing is unjustifiable because of the "great quantities of powerfully radioactive strontium isotope Sr^{90} produced," is to be questioned. Radioactive strontium is not formed in the fusion reaction. Some Sr^{90} will be formed, however, if the fission process is used to trigger the fusion reaction.

In summary, an interesting and logical picture of "The Atomic Age and Our Biological Future" has been presented. This book is recommended for those who desire information on the effects of radiation on man.

MERLE K. LOKEN, Ph.D.

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Human Perspiration, by YAS KUNO, M.D., edited by Robert F. Pitts, M.D., 1956. No. 285, American Lecture Series, monograph in Bannerstone Division of American Lectures in Physiology. Springfield, Illinois: Charles C Thomas; Oxford: Blackwell Scientific Publications, Ltd.; Toronto: Ryerson Press, 416 pages. \$9.50.

Dr. Kuno, one of the world's pioneer physiologists, and his associates have spent more than thirty years in their studies of the anatomy, physiology, and biochemistry of the sweat apparatus. The results of these efforts are presented in this monograph,

which represents the most authoritative and comprehensive work on human perspiration now available.

Included in the 13 chapters are detailed discussions of insensible perspiration, anatomy, physiology, and evolutionary development of the sweat apparatus, regional and general sweating, chemistry of sweat acclimatization, and the significance of sweating. There is also an extensive appendix in which the author deals with research methods for the measurement of perspiration. Since Dr. Kuno has not attempted to present a complete review of the literature, but rather the results of his own studies, the short bibliography of selected references is entirely adequate and provides valuable reference material. The book is well illustrated throughout, and there are many excellent tables and diagrams to enhance the value of the author's descriptions. It is a welcome addition to the growing literature on human perspiration and belongs in the library of every dermatologist.

ELMER M. HILL, M.D.

•
Hypophysectomy, edited by O. H. PEARSON, M. D., 1957. Springfield, Illinois: Charles C Thomas, 154 pages. \$5.00.

This small book is a report of the proceedings of a conference held at the Sloan-Kettering Institute, New York City, March 19 and 20, 1956.

At this meeting, 24 participants discussed the removal or destruction of the hypophysis for the treatment of carcinoma of the breast and for a few tumors of other origin, such as diabetes mellitus.

The technic of several different approaches to the pituitary fossa make it quite obvious that the usual approach used for pituitary tumor surgery is not satisfactory and must be modified in order to adequately expose the pituitary fossa for total removal of the gland.

Several speakers referred to removal of the anterior clinoid process, but it is doubtful whether anyone has actually removed the anterior clinoid process. It is true that some do remove the medial clinoid processes.

Dr. Luft reported 37 cases of hypophysectomy for cancer of the breast and concluded that patients who responded unfavorably were over 60 years of age, had metastases to the nervous system or extensive liver metastases. However, Ray and Lipsett reported 10 of 18 patients

(Continued on page 18A)

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BOOK REVIEWS

(Continued from page 368)

over 60 years of age who did respond favorably.

Kennedy selected patients for operation using the following criteria:

1. The premenopausal woman who improves after therapeutic castration.

2. The woman who undergoes spontaneous menopause at the time of recurrence and slowly progresses.

3. The postmenopausal woman who responds to estrogen or androgen hormones.

It was also suggested by Pearson that a woman in whom exacerbation of carcinoma of the breast occurs if given estrogen could be expected to respond, but he did not advise attempting the operation because of possible serious consequences.

Both Ray and Matson found that if the pituitary stalk is preserved without trauma, diabetes insipidus is less apt to develop.

Since hypophysectomy for carcinoma of the breast has only been done recently, most of the reported cases had not been followed for long periods, and survival is reported in months rather than years. Ray reported the average survival of 36 patients who did respond to be 9.3 months, but 21 of them were still living.

The indications for hypophysectomy in diabetes are not yet settled. Luft reported that the procedure appeared to arrest the progressive retinopathy and new aneurysms did not develop, but intraocular hemorrhages did continue to occur, although less frequently.

Physiologic effects of hypophysectomy are discussed. The premenopausal woman has prompt cessation of menses. Hypothyroidism develops. Ability to conserve sodium is not disturbed, apparently because of continued aldosterone secretion. Diabetes insipidus occurred in most patients.

The final section of the book concerns radiation hypophysectomy. Various types of irradiation have been used, but, in general, irradiation failed to destroy the hypophysis as completely as surgery; the therapeutic results were not as good; and the incidence of injury to the optic nerves or other intracranial nerves was disturbingly high.

This book should be of value to internists and general practitioners who wish to know what can be accomplished by hypophysectomy.

WILLIAM T. PEYTON, M.D.

Liver-Brain Relationships, by I. A. BROWN, M.D., 1957. Springfield, Illinois: Charles C Thomas, 176 pages. \$6.50.

This small volume consists primarily of a summary of our present knowledge concerning the relationship between the function of the liver and brain. Its unique feature is that it has been written by a neurologist rather than an internist. A good share of this volume is devoted to a review of the literature on the liver-brain inter-relationship covering various aspects of the clinical manifestations, the pathologic changes, and the biochemical alterations involved. The author includes a study of 82 cases of liver disease in which 40 died in hepatic coma, allowing for complete autopsy studies. On the basis of these cases, the author recapitulates the clinical manifestations of the cerebral involvement and the variation in the central nervous system changes. This volume is concluded with some speculations on the possible biochemical changes that could be implicated in the liver-brain process and the concept that probably not one but many biochemical alterations are involved.

Although presenting no new material, this small volume does offer an excellent review of the subject in a clear, concise fashion.

A. B. BAKER, M.D.

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The Human Ear Canal, by ELDON T. PERRY, M.D. A monograph in the Bannerstone Division of American Lectures in Dermatology, edited by ARTHUR C. CURTIS, M.D., 1957. Springfield, Illinois: Charles C Thomas, 116 pages. \$4.75.

It is generally agreed that the study and treatment of the human ear canal is usually assumed by the otologist, but certainly it is likewise felt that the dermatologist, because of his greater familiarity with skin diseases in general, is much better equipped to cope with many of the skin problems relating to the human ear. This monograph, as the author states in the introduction, is "a dermatologist's eyevue of the human ear canal."

The author devoted two years to detailed study and investigation of this subject. In this volume, he reports his findings and conclusions. That the literature on external ear disease has been carefully reviewed may be attested to by the complete bibliography appended to each

chapter. The essential facts concerning the gross and microscopic anatomy of the ear canal and its appendages—the ceruminous glands, the sebaceous glands, and the hairs—are well presented and illustrated. In addition, a report of original investigations concerning the formation and stimulation of flow of cerumen by the ear canal is given in detail. This work was carried out on inmates of penal institutions and hospital employees. At the same time, a careful analysis of the normal and abnormal resident bacteria and fungi found in the ear canals of the volunteer subjects, with and without external otitis, was made. Original work in the physiology of the excretory glands was also carried out. The cerumen of the human ear is a mixture of the secretory products of the sebaceous and ceruminous glands. The author found that the secretion of the ceruminous glands resembles that of the apocrine sweat glands of the axilla. These glands both respond to the same stimuli: pain, emotion, anxiety, fear, adrenergic drugs, and mechanical stimulation.

The chapter describing the clinical picture of external otitis is very well done. It presents a broader and more comprehensive view of external otitis than the general physician or otolaryngologist usually considers. For instance, a differential diagnosis of this condition discusses: furunculosis, seborrheic dermatitis, contact dermatitis, neurodermatitis, pyoderma, infections eozematoid dermatitis, cellulitis, psoriasis, chronic discoid lupus erythematosus, hot weather ear, and epthelioma. This dermatologic approach to a correct diagnosis seems logical. A diagnosis of external otitis is not enough. One must consider the foregoing conditions.

In 6 short pages, the author gives very sketchy and incomplete directions regarding general principles and specific treatment for the conditions listed under differential diagnosis. In my judgment, it would be very difficult for a young inexperienced physician in general practice to read this chapter and feel that he could properly care for a patient with external otitis.

Excluding the chapter on treatment, I found this book very well worth reading. It contains much valuable information regarding the human ear canal, especially from the dermatologist's viewpoint.

GEORGE M. TANGEN, M.D.

A Study of Femoral Head Replacement Prostheses

GEORGE M. HART, M.D.

Minot, North Dakota

DURING THE PAST FIVE YEARS, 23 femoral head prostheses have been inserted in 22 patients in the orthopedic section of the Northwest Clinic. In December 1957, a follow-up study was made on 20 patients who had been operated upon prior to that time.

Six different types of prostheses have been used, including 8 metal Judets, 3 metal Judets with skirt extensions, five Eichers, 1 acrylic Judet with skirt extension, 1 Naden-Rieth, and 5 vitallium Moores (figure 1). At the present time, the vitallium Moore is the prosthesis of choice. Several difficulties experienced with types previously used have led to a search for one that is more satisfactory. Three complications that occurred in patients in whom metal Judet prostheses were used were: (1) rotation of the appliance and its stem in the trochanteric and subtrochanteric region of the femur with associated pain; (2) settling of the prosthesis on the neck of the femur with lateral protrusion of the stem; and (3) upward shifting of the stem in the trochanteric region following gradual bone erosion superior to the stem, allowing the prosthesis to assume a position of varus. In patients in whom settling of the appliance took place, the stem protruded laterally from 1 to 2 cm. Over this protruding stem, a bursa developed with associated tenderness and pain

over the lateral trochanteric region. In 1 patient, this pain was sufficiently severe to require removal of the protruding portion of the stem. No further settling occurred afterwards, and the patient's complaint was relieved.

The chief difficulty with the Eicher prosthesis was in preparing the bed for the prosthesis stem in the shaft of the femur. Due to the size and shape of the Eicher stem, a rather wide bed must be prepared with the Eicher rasp. Considerable cortical bone has to be removed, which is a difficult procedure. In 2 patients in whom Eicher type of prostheses were used, the shaft of the femur was fractured during their insertion. Another difficulty with the Eicher type has been fracture of its stem. Although this complication did not occur in any of the patients in whom an Eicher prosthesis was used in this series, 1 patient was seen in consultation in whom it did occur. The original injury had included a fracture of the acetabulum, permitting the prosthesis to be seated deeper than usual in the acetabulum. Motion of its head was restricted, which produced excessive strain on the stem.

Metal Judet prostheses with skirt extensions were used in 3 patients as compared with 8 in whom the standard metal Judet was employed. In these 3 patients, no femoral neck remained and the prosthesis with the skirt extension was used to provide greater distance between the trochanteric region and the head of the femur. Patients with an inadequate femoral neck lose

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Fig. 1. Various types of femoral head replacement prostheses. Left to right (*above*): acrylic Judet, acrylic Judet with skirt extension; (*below*): metal Judet, metal Judet with skirt extension, Naden-Rieth, vitallium Moore, Eichler, and Minneapolis.

active abduction of the hip as the line of pull of the abductor muscles on the greater trochanter approaches 180 degrees with the shaft of the femur.

An acrylic Judet prosthesis with skirt extension was used in 1 patient. However, because of frequent reports of erosion and fractures, its use was not continued.

INSERTION OF THE PROSTHESIS

Several surgical approaches have been used for insertion of prostheses. In the 23 operations which have been performed up to this time, an anterior approach was used in only 3 instances. A posterolateral approach was used in all the rest. In the earlier cases, the posterolateral approach described by Gibson¹ was used in which the gluteus maximus was reflected medially and distally along its upper border, and the gluteus medius and minimus were sectioned at their insertion into the greater trochanter and then reflected anteriorly and proximally. In the more recent cases, the approach described by Austin Moore² has been used in which the fibers of the gluteus maximus are separated about 1½ in. above the lower border of the muscle. The sciatic nerve is identified and retracted medially. The gluteus medius is no longer sectioned but is retracted anteriorly to expose the posterior rotators of the hip which are divided at their insertions. The capsule is opened and, after insertion of the prosthesis, resutured whenever possible.

Some difficulty has been experienced with this approach, particularly in hips in which the cap-

sule is considerably scarred. In several cases with scarred, contracted capsules, the gluteus minimus and medius have been divided as in earlier procedures. However, ambulation can be started earlier if the gluteus medius is left intact.

Postoperatively, patients were placed in balanced suspension for ten days to three weeks, depending upon whether or not the gluteus medius had been sectioned. Ambulation was then started by the physiotherapist, beginning with active exercises of the hip, thigh, and knee and progressing to walking between parallel bars and, finally, to crutches.

In earlier cases, crutches were discarded for a cane as soon as the patient gained sufficient strength. However, more recently, following the advice of Austin Moore, weight bearing has been deferred to allow strengthening of the cortical bone beneath the prosthesis.

INDICATIONS FOR USE OF FEMORAL HEAD PROSTHESES

In this series, fracture of the femoral neck with nonunion has proved to be the most frequent indication for insertion of a femoral head prosthesis. Of the 23 hips operated upon, 15 have had nonunion of intracapsular fractures. Degenerative arthritis was an indication for surgery in 4 of them. In 1 of these patients, the degenerative arthritis was due to a congenital dysplasia of the hips and both were operated upon. One of them with degenerative arthritis had an associated fibromyxoma of the upper femoral neck and head.

In 1 patient, the indication for surgery was ankylosis of the hip joint after septic arthritis. The original problem in this patient had been an acute slipped capital femoral epiphysis. Operation had been performed elsewhere and was followed by infection. One patient had a healed fracture of the femoral neck with aseptic necrosis of the head. The youngest patient in this series, a 13-year-old boy, had a slipped epiphysis of two years' duration with complete destruction of the head and neck. The parents of this child were Christian Scientists and refused to seek medical care until the head and neck had been completely destroyed.

CONTRAINDICATIONS FOR USE OF FEMORAL HEAD REPLACEMENT PROSTHESES

Several contraindications have been formulated for the use of femoral head prostheses. Acute fractures of the femoral neck are still treated in this clinic by internal fixation rather than by replacement of the head with a prosthesis. One exception was made in a mentally confused individual. Patients who are young and have the greater portion of their years ahead of them are

generally not thought to be good candidates for prostheses. Arthrodesis, when possible, is felt to be preferable in young patients. In general, results have been poorer in patients in whom prostheses have been inserted for arthritis of the hip than in those who were treated for nonunion of the femoral neck. To qualify for a prosthesis, a patient with an arthritic hip should be unable to walk preoperatively without crutches or, at least, a cane and should fully understand the situation before surgery is carried out. Patients with rheumatoid arthritis probably are not good candidates for femoral head replacement prostheses.

FOLLOW-UP STUDY

The age of patients in this series ranged from 13 to 81 years. The average was 63 and the median 68 years. Fifteen of the 22 were women, and 7 were men. Of the 23 hips operated upon, the left side was involved 14 times and the right 9 times.

A follow-up study was made in December 1957 on the 20 patients operated upon up to that time. The average time elapsed postoperatively in this study was 25.7 months with the longest interval 59 months and the shortest 2 months. The study was made by examination in a number of cases and by a questionnaire mailed to patients who were unable to come in for re-examination. Of the 20 patients, 35 per cent were walking unaided with neither a cane nor a crutch. Thirty per cent were walking with the aid of a cane, 25 per cent with crutches or a cane, and 5 per cent were confined to wheelchairs. No patient was bedridden. In 5 per cent of the series, the present status was unknown.

All of the patients were asked to evaluate the results of their surgery. They were requested to be factual and frank in their answers. Twenty per cent regarded their postoperative results as excellent; 53½ per cent felt that the results were good; 13½ per cent stated that the results were fair; and 13½ per cent reported poor results. This evaluation was based on 15 hips in 14 patients; 2 were dead, 1 was mentally confused, and the whereabouts of 3 was unknown.

Results were also evaluated by the author based either on examination or interpretation of answers to questions in the questionnaires. These evaluations were: excellent—10 per cent, good—65 per cent, fair—15 per cent, and poor—10 per cent.

Of the 21 hips operated upon, 6 patients had no pain in the operated joint, 5 had mild pain, 5 moderate pain, 1 severe pain, and, in 4, the evaluation of pain was not determined.

Patients were asked the question, "Is your hip better, worse, or the same as before operation?"



Fig. 2. Moore prosthesis in place.

Eighteen stated it was better, 1 stated that it was worse, and 1 stated that it was the same as before surgery.

COMPLICATIONS

A number of complications have followed insertion of femoral prostheses. These have included dislocation of the prosthesis, fracture of the prosthesis, fracture of either the acetabulum or the femur, infection, phlebitis, rotation of stem-type prostheses producing pain, and settling of prostheses due to erosion of underlying supporting bone.

In the 23 hips operated upon here, dislocation has occurred in 2 instances. One of these was treated by closed reduction and a spica cast for one month. The patient then became ambulatory and no further dislocation occurred. Unfortunately, he was killed in a fire five months later so follow-up study was brief. In the second patient with dislocation, closed reduction was unsuccessful. Open reduction was, therefore, carried out and a spica cast applied and maintained for one month. The prosthesis remained reduced, but, as the patient was mentally confused, she was confined to a wheelchair until her death, which was caused by a cerebrovascular accident three months after leaving the hospital.

No broken prostheses occurred in this series. Fracture of the acetabulum also did not occur, but the shaft of the femur broke three times during surgery. An Eichler prosthesis was used in 2 of these instances, and a Moore vitallium prosthesis was used in the other. In each case, fracture was not extensive enough to interfere with secure seating of the prosthesis and uneventful healing followed. Each of these patients is ambulatory at the present time.

No infection, phlebitis, or postoperative mortality has occurred in any of the patients of this series.

In one patient in whom a metal Judet prosthesis had been used, the device settled with gradual erosion of the underlying bone of the neck of the femur, allowing lateral protrusion of its stem. Over a period of months, an annoying bursitis occurred over the protruding stem, which finally necessitated its removal. This was accomplished by use of a circular saw. The saw was used in a Luck motor, and about forty-five minutes of actual cutting time was required to remove the stem. Postoperatively, the bursitis was relieved, and the patient remained ambulatory with the use of 1 cane until his death from acute leukemia four years after operation.

CONCLUSIONS

The femoral head replacement prosthesis is an extremely useful orthopedic appliance. It is felt that it should not be used routinely for fresh hip fractures unless specifically indicated, as in mentally confused or extremely uncooperative patients in whom hip nailing would probably be unsuccessful.

It is felt that the vitallium Moore prosthesis is the best available at the present time (figure 2). However, the vitallium Eicher, shaped much

like the Moore but with a longer neck and narrower stem, should be useful when the femoral neck is gone.

SUMMARY

During the past five years, 23 femoral head prostheses have been inserted at the Northwest Clinic. A review of these cases has been presented. Six different types of femoral head prostheses were used. At the present time, the vitallium Moore is the prosthesis of choice.

Complications of intracapsular hip fractures, including nonunion and aseptic necrosis of the femoral head, are the chief indications for insertion of a femoral head prosthesis.

A candidate for this procedure should be sufficiently disabled preoperatively to require the use of a cane or crutch. This is particularly important when the indication for insertion of a prosthesis is an arthritic hip with an intact femoral neck. Patients with rheumatoid arthritis involving the hip joints frequently have pain and limited motion after insertion of a femoral head prosthesis.

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INTENSE PAIN in the lower extremities may be caused by neoplasms of the peripheral nervous system. Diagnosis is aided by thorough systemic examination, including careful palpation of the peripheral nerves.

Peripheral nerve tumors may be the site of local pain that radiates along the course of the nerve. Pain produced by tumors is generally constant and is not alleviated by rest, heat, or cold. Sensory or motor defects may not be apparent if the tumor is benign. By palpation, tumors of peripheral nerves are tender, round, smooth, and well demarcated. Such tumors are movable from side to side but are fixed in the long axis of the nerve. Comparison of palpatory findings in the contralateral limb is helpful when small tumors are suspected.

Treatment consists of surgical removal. Perineural fibroblastomas, the most common solitary tumor found on peripheral nerves, push the nerve trunk to one side or expand the nerve trunk about the tumor. The nerve does not enter the mass but is displaced laterally or completely surrounds the tumor so that a good cleavage plane often is found and nerve function is not impaired. If the tumor is thought to be malignant or sharp separation is not possible, resection should be done. Loss of nerve length can be corrected by proper positioning of the extremity, mobilization of the proximal and distal nerve ends, and rerouting of the nerve.

SIDNEY W. GROSS, M.D., and AARON SCHWARTZ, M.D., Mount Sinai Hospital, New York City. *Neurology* 7:711, 1957.

Eczema, Allergic Rhinitis, and Asthma in Infancy and Childhood

ROBERT B. TUDOR, M.D.

Bismarck, North Dakota

THE PURPOSE OF THIS PAPER is to emphasize the importance of diagnosing and treating allergic diseases early in life. Ten per cent of the population, or about 17 million people, are allergic. According to Prickman,¹ there is no sharp dividing line between allergic and non-allergic individuals. The allergic reaction is a matter of threshold, which is lowest in those who are sensitive to common allergens. A person whose ancestors have been allergic merely inherits the predisposition or capacity to become sensitized. Certain cells in the body become sensitized by contact with a substance, for example, ragweed antigen, and specific cellular antibodies develop for ragweed antigen. With subsequent contact between ragweed antigen and the cellular antibodies, the cell is injured, resulting in the liberation of histamine from the injured cell. Since living tissue contracts the instant antigen contacts it,² the reactions may take place where the nerve endings are located. This may mean that acetylcholine is also secreted as a result of the reaction and induces muscle contractions that cause sneezing, asthma, or gastrointestinal upsets. The possibility that serotonin may be one of the causes of asthma and other allergic respiratory disturbances has recently been reported.³ The concept that allergy is produced by the splitting of proteins by enzymes has been supported by Johnstone, Becker, and Osler.^{4,5} The shock organ or the site of the reaction is not constant even in the same individual or even in response to the same antigen.

The eczema of infancy may clear up and be followed by asthma or allergic rhinitis. The typical sequence is:⁶ eczema in infancy due to foods, especially to egg and cow's milk; asthma in childhood from dusts, especially animal danders; and, later, hay fever from pollen. Persons with a family history of frequent severe allergic

disease tend to have clinical manifestations of allergy early in life.⁷ Emotional stress may be accompanied by vascular changes that are identical with those seen in immunologic allergy. These vascular changes are thought to be caused by the liberation of acetylcholine at vasomotor nerve endings.

DIAGNOSIS

It is of extreme importance to diagnose allergic manifestations as early as possible so that more chronic allergies may be prevented. Clein⁸ showed that 39 per cent of 100 infants exhibited their first allergic symptoms by the age of 1 month and 89 per cent by the age of 1 year. Therefore, it is obvious that most allergies should be diagnosed by the end of the first year. Manifestations of cow's milk allergy are some of the earliest allergies seen.⁹ Colic, vomiting, diarrhea, nasal stuffiness, cough, wheezing, or eczema may occur following exposure to cow's milk during the neonatal period.

After the clinical diagnosis is made, the physician should search for the cause by skin testing.^{10,11} The number of allergens used in testing is best determined according to the locale and age of the patient. From the standpoint of safety, the scratch test is the method of choice, especially in children. Immediate or delayed general reactions to scratch tests are extremely rare and, to my knowledge, have not resulted in a single fatality. Children react to test substances more readily and with weaker extracts than do adults. Peshkin¹² has emphasized several pitfalls in the interpretation of the skin tests. The size or intensity of the skin reaction to an allergen does not determine its importance in the etiology or does it indicate the degree of general sensitivity that is present. Pollen asthma may occur with negative cutaneous reactions to pollen but with typical seasonal incidence. A history will show that a patient can be sensitive to a given substance despite the fact that the skin reactions may be negative. Many positive allergic skin test reactions eventually and spontaneously become permanently negative. The disap-

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pearance of a positive skin reaction to a food does not necessarily indicate clinical tolerance to that food. Specific hyposensitization treatment against the causal pollen during a period of years may result in complete eradication of the positive skin reaction to the exciting pollen. This does not imply that the patient is cured of pollenosis.

ALLERGENS IN INFANCY

This paper is based on my experience with 396 patients, 117 with allergic rhinitis, 172 with eczema, and 107 with asthma. The most common food allergens in my practice in the order of number of positive skin tests are found in table 1. The most common pollens, inhalants, epidermals, molds, and insects are found in table 2.¹³ House dust is a very complicated antigen containing bacteria, molds, insect dust, animal dander, and cottonseed. Allergies due to house dust are usually worse in the fall and winter after forced air heaters are turned on. The pollen seasons for Bismarck are shown in figure 1.

Feather pillows and old mattresses are an important source of fungi. In a series of 380 cases, molds caused clinical allergy in 111, or 29 per cent.¹⁴

Other allergens, which probably are of more significance than we realize, are the hydrocarbons, such as stove gas, auto exhausts, gasoline, kerosene, perfume, Glass Wax, naphtha moth balls, artificial coloring, Lysol, phenol, fresh newsprint, rubber, detergents, and shoe polish and the physical agents—cold, sunlight, and heat. These may act as triggers to set off an attack of clinical allergy.

TABLE 1
COMMON FOOD ALLERGENS

1. Milk	11. Salmon
2. Spinach	12. Pork
3. Tomatoes	13. Corn
4. Walnuts	14. White potatoes
5. Oranges	15. Peanuts
6. Chocolate	16. Carrots
7. Egg white	17. Peaches
8. Bananas	18. Beets
9. Peas	19. Wheat
10. Apples	20. Sweet potatoes

TABLE 2
COMMON INHALANTS

Inhalants and epidermals: House dust, feathers, wool, animal dander, cottonseed, tobacco smoke.
Pollens: Trees: Box elder, cottonwood, elm, oak. Grasses: June, orchard, timothy. Weeds: Ragweed, chenopod, amaranth, sage, plantain.
Molds: Hormodendrum, Alternaria
Insects: Caddis flies, May flies

The inhalants are usually carried by warm air, and so the fallout is greatest on the windward side of a city and least on the leeward side.¹⁵ Warm air rising over the city carries them up into the clouds. The fallout is also greatest at night and in early morning because at these times there is a layer of cool air surrounding the earth into which the warm air slowly flows.

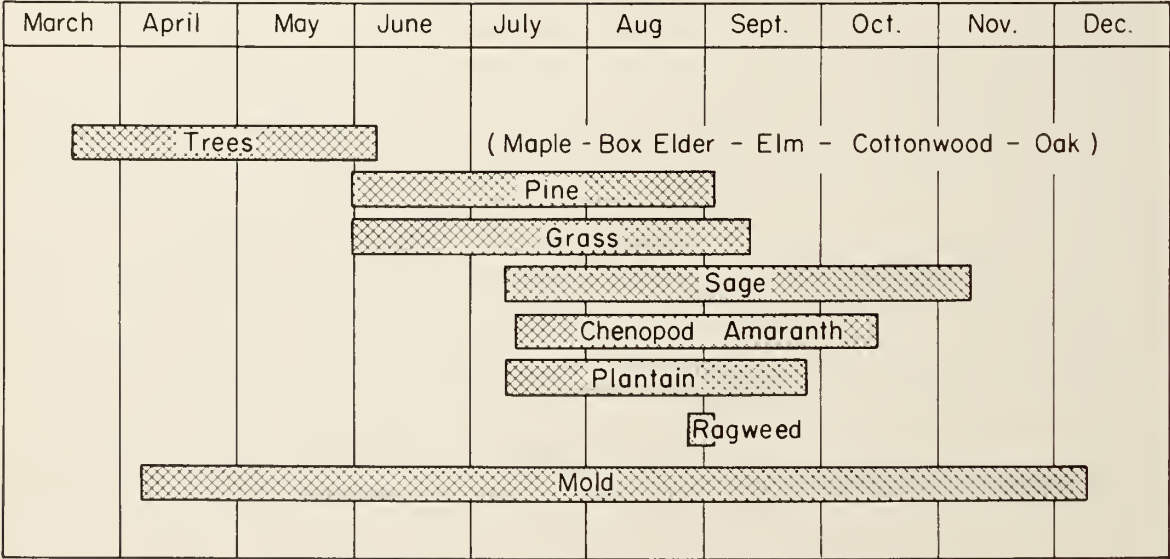


Fig. 1. Pollen seasons, Bismarck, North Dakota, 1956-1957.

TABLE 3
ALLERGIC DERMATOSES

1. Atopic eczema	8. Eczema vaccinatum
2. Atopic erythroderma	9. Neurodermatitis
3. Seborrheic eczema	10. Urticaria
4. Nummular eczema	11. ID reactions
5. Contact eczema	12. Erythema multiforme
6. Infectious eczema	13. Drug reactions
7. Herpetie eczema	

ECZEMA

Before making a clinical diagnosis of atopic eczema, a differential diagnosis should be carefully considered (table 3). The child with atopic eczema may have pale, comparatively cool, clammy skin.¹⁶ The disease is attended by extreme itching, and there is usually heat, redness, swelling, vesiculation, oozing, and crusting. Blockage of the sweat ducts may cause sweat retention. This is manifested by small, deep seated vesicles on the palms and along the sides of the fingers. Atopic eczema may progress and become seborrheic, but it is unusual for seborrheic eczema to become atopic. In seborrheic eczema, potato chip scaling occurs; the eruption is usually orange colored and waxy; itching is less intense; and scratching and lichenification are usually absent. These lesions usually clear centrally. Seborrheic lesions taper off abruptly, involve the diaper area, and they do not cause depigmentation of the skin as the atopic eczemas do. If the skin is examined closely, tessellation or checkerboarding is often seen. It is important to make an etiologic diagnosis as early as possible by skin testing or food avoidance. If the eczema flares during the pollen season or when there is an increased amount of dust in the house, the child should be desensitized against those inhalants.¹⁷ The diet and environment should be restricted. Even when the skin tests are negative, it is wise to avoid milk, wheat, eggs, oranges, chocolate, fish, nuts, spinach, and tomatoes. Fuzzy toys, plastic articles, and feathers should be kept away from the child. If there is a wool carpet in the room in which the child spends most of his time, it is wise to immobilize the dust in this area by spraying with Allergex. Watery solutions should be used when the eruption is subacute or chronic. Burow's solution, Zephiran solution, saline solution, or Aveeno may be used until the eruption is dry. An ointment incorporating aluminum acetate, such as Burow's paste or Hydrosal, will speed the drying of the lesions. Lassar's plain zinc paste is the most popular ointment for chronic eczema. Into this paste coal tar, wood

tar, bituminous tar, petroleum tar, or ammoniated mercury may be incorporated in 2 per cent concentrations. Bituminous tar, Ichthyol, has the action of coal tar without causing irritation in subacute eruptions and is a good medication to use initially. Coal tar may be used in 5 per cent strength, as in Tarbonis, or in more specialized ointments like Kolpix A, which is high in tar acids, and Kolpix D, which is high in naphthalene. Four steroids are available in ointments, creams, or lotions. They cause different reactions on the skin, and eruptions which are irritated by one may subside following the use of another. These four steroids are hydrocortisone, prednisolone, fludrocortisone (Florinef acetate), and hydrocortisone ethamate hydrochloride (Magnacort). The quinolines, Sterosan and Vioform, are antieczematous and antifungicidal. They may be incorporated into a tar. In the presence of secondary infection, it may be necessary to use an antibiotic on the skin. It is wise to use antibiotics that are not given in excess internally, such as polymyxin B, bacitracin, or neomycin. For severe itching and lesions which cover much of the skin, the steroids should be administered by mouth or by injection. There is no reason why a sick or very irritable child should be denied the relief that one of the steroids will provide. I achieve my best results with prednisolone or hydrocortisone in a dosage of 5 or 10 mg. every six hours until the desired effect has been secured. The antihistamines and anticholinergics are used for their sedative and antipruritic value. They have pronounced histamine antagonism and some local anesthetic value. The tranquilizers may supplement other medication. It is sometimes necessary to use ultraviolet radiation on the skin, and some children are relieved if they are moved to a warm climate.

ALLERGIC RHINITIS

Seasonal and perennial allergic rhinitis present about the same problems, and so I will consider them together. The diagnosis is easy to make if thought is given to these conditions and if the nose and throat of each child are examined. The nasal mucosa and throat mucosa are usually pale, though they may be reddened if the child has a secondary bacterial infection. A smear taken from the nose or posterior pharynx and stained with Hansel's stain will show clumps of eosinophils.¹⁸ Wright's stain will not readily bring out the eosinophils. Blood eosinophilia in excess of 4 per cent may be present. Roentgenograms usually show opaque sinuses. These children may or may not sneeze a great deal. Their noses

are always stuffy, and their history reveals that they continually breathe through their mouths. They should be skin tested and desensitized with the pollens, molds, dusts, and epidermals to which they are sensitive.¹⁹ The diet and environment should be restricted. Nose drops are of no benefit. Steroids given orally may help to bridge the period of skin testing and may bring relief during periods of more acute allergy. Irradiation of the nasopharynx may be necessary in order to obtain the optimum benefit from the allergic treatment. Untreated allergic rhinitis may be associated with obstructive hearing loss.

ASTHMA

Asthma should be diagnosed as early as possible in order to prevent the development of chronic lung pathology.^{20,21} In making the clinical diagnosis, it is wise to consider that all asthmatic patients wheeze but that not all those who wheeze have asthma. Conditions in the lung, bronchi, and mediastinum, such as childhood bronchiolitis and pancreatic fibrosis, should be ruled out. All asthmatic children have allergic rhinitis. They should all be skin tested and desensitized. The diet and environment should be restricted. In the treatment of the acute case, the following are of importance: an allergen-free room, rest, control of cough, liquefaction of sputum, prevention of anoxemia, and prevention of complications.²² The chemical fogs, Alevaire and Tergemist, are of great help in treatment of the acute asthmatic attack. Prophylactic penicillin may reduce the number of asthmatic attacks. Potassium iodide in either saturated solution or in tablets, such as Quadrial, may be given daily, preferably at bedtime. I usually give 10 drops of the saturated iodide solution or ½ of a Quadrial tablet daily. The cholinergic blocking agents, which decrease bronchial spasm and mucous secretion, do not usually help. The sympathomimetic drugs, Adrenalin, ephedrine, or Isuprel, may be used in treatment of the acute attack as well as in the prevention of flare-ups. The xanthine alkaloids stimulate the bronchial muscle directly. They may be given by mouth or rectally. The most popular antiasthmatic medications contain ephedrine, aminophylline, and phenobarbital or an antihistamine. They may be given to treat an acute attack, or they may be given daily to help in prevention. The

steroids are of great value in treatment of acute asthma. The quicker the asthmatic wheezing is controlled, the less severe the asthmatic attack, so that I don't hesitate to start a patient with severe asthma with 5 or 10 mg. or prednisolone or hydrocortisone every six hours until the wheezing is controlled. The antihistamines are of no value in the treatment of asthma. Nebulizers, which usually nebulize Adrenalin or Isuprel, are of some value, but I have had no great success with them except in the occasional case. Irradiation of the nasopharynx may help. Intermittent positive pressure breathing with Alevaire and Isuprel is mentioned for the sake of completeness, but I have had no experience with these agents for this purpose. A child with asthma in whom there is a great emotional component is also said to benefit if he is removed from the home.

Dr. Glaser²³ has shown that the development of major allergic diseases in potentially allergic infants is greatly decreased by avoidance of cow's milk. In a study he made with 336 children, cow's milk was withheld from birth in 96, and, in this group, a major allergy developed in only 14.6 per cent in six years. In a control group of 175 children who were nonrelated to the experimental group, a major allergy developed in 52 per cent in six years. In a control group of 65 children who were siblings of the experimental group, a major allergy developed in 64.6 per cent in six years. It has been my practice to withhold cow's milk from birth in infants who are born into families with frequent severe allergies. Babies take Mull-Soy, meat base, or Nutramigen easily. After one year's avoidance, cow's milk can be introduced into the diet without difficulty.

SUMMARY

The importance of early clinical and etiologic diagnosis of eczema, allergic rhinitis, and asthma in infancy and childhood has been emphasized. Fewer severe allergies occur in the older child if allergic manifestations are treated vigorously in infancy.

The preparation of this paper would have been impossible without the cooperation of my associates at the Quain and Ramstad Clinic and Dr. Norman Clein of Seattle, Washington.

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SURGERY IS NOT NECESSARY for babies with sternocleidomastoid tumors that do not cause progressive deformity.

The swelling in the sternocleidomastoid muscle usually appears ten to fourteen days after birth. The hard, fusiform, immobile, and nontender mass increases for two to four weeks, nearing the size of a large almond. Most growths disappear by the fifth to the eighth month and cause no deformity.

Of 1,283 newborn infants, 23 had sternocleidomastoid tumors, an incidence of 1 in 56. None of the 20 children who were observed for as long as four years had deformities.

FELIX G. LINE, M.D., and MARY LEE LINE, M.D., Knoxville, Tennessee. *J. Tennessee M.A.* 51:133, 1958.

ANY ABDOMINAL MASS in a newborn infant should receive prompt surgical exploration. Preliminary studies include abdominal roentgenograms, intravenous urograms, urinalysis, complete blood count, and nonprotein nitrogen determination.

Of 32 infants in whom an abdominal mass was noted on the first day of life, 30 were operated upon, with a mortality of 10 per cent. A malignant tumor was found in 4 patients.

One-half the masses were in the kidneys. One-third of these were located so far anteriorly that renal origin was suspected only after urographic study. In 13 infants with unilateral hypoplastic multicystic kidneys, the normal kidney has remained so for periods up to twenty years.

Masses in 6 infants were in the digestive system and included liver cyst, choledochal cyst, distended gallbladder, duplication of the ileum, mesenteric cyst, and ileal volvulus in 1 patient each.

Other benign masses consisted of 2 ovarian cysts, 3 hydrometrocolpos, and 1 teratoma. Wilms's tumor, neuroblastoma, leiomyosarcoma of the colon, and primary hepatoma made up the 4 malignant neoplasms.

The Wilms's tumor was discovered incidentally during the first day of life as a right flank mass in an infant with erythroblastosis. After exchange transfusion had corrected the hematologic condition, a right nephrectomy was successfully performed, and the child is still well at the age of 4 years.

LUTHER A. LONGINO, M.D., and LESTER W. MARTIN, M.D., Harvard Medical School and Children's Hospital, Boston. *Pediatrics* 21:596, 1958.

Use of the Multi-Interval Blood Glucose Method in a Diabetic Children's Camp

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THE MULTI-INTERVAL blood glucose method, utilizing the Clinitron, has been described in a previous paper,¹ which includes a description of the machine capable of automatically processing blood samples for the estimation of blood glucose. The purpose of this report is to present further objective evidence of the clinical usefulness of the method in the management of juvenile diabetes in a summer camp with very limited laboratory facilities. This procedure has been successfully utilized by us for the past three years at Camp Sioux for diabetic children, which is sponsored annually by the North Dakota Diabetes Association, Inc., at Turtle River State Park, Arvilla, North Dakota.

Each of 22 campers was carefully checked daily at bedtime by the camp physician. All patients whose urine tests had shown excessive glycosuria, with or without acetonuria, and all those experiencing moderate to severe hypoglycemic reactions during the day's activities were required to have blood glucose determinations to aid in proper adjustment of insulin dosage. The procedure for collecting blood and processing blood glucose determinations was as follows:

Blood specimens were obtained by venipuncture and added immediately to tubes containing potassium oxalate and sodium fluoride. A preliminary screening of the specimens was done to see if their glucose content exceeded the 130-mg. per cent level. This was done by adding 0.1 cc. of the blood specimen to 5.0 cc. of distilled water in a Clinitron reaction tube. The tubes were then processed by the Clinitron, utilizing ferricyanide tablet 3A. The color of the reaction tube was noted after completion of the process, and a blue reaction indicated a glucose concentration below 130-mg. per cent. A colorless re-

action indicated a glucose concentration greater than 130-mg. per cent.

Blood specimens with glucose concentrations in excess of 130-mg. per cent were then further analyzed by the multi-interval blood glucose method.

One cubic centimeter of the blood specimen was diluted with 9.0 cc. of distilled water in a test tube and mixed. A series of 5 reaction tubes containing 4.0 cc. of distilled water was prepared. The following quantities of blood-water mixture were added to the tubes:

- 0.9 cc. of the blood-water mixture was added to tube 1.
- 0.8 cc. of the blood-water mixture was added to tube 2.
- 0.7 cc. of the blood-water mixture was added to tube 3.
- 0.6 cc. of the blood-water mixture was added to tube 4.
- 0.5 cc. of the blood-water mixture was added to tube 5.

The tubes were processed in the Clinitron, utilizing ferricyanide reagent tablets 3A. The first tube in the series to show a blue reaction was considered the end point. Thus, a blue reaction in tube No. 1 represented a blood glucose level of less than 144-mg. per cent but more than 130-mg. per cent. A blue reaction in tube No. 2 represented a blood glucose level of less than 162-mg. per cent but more than 144-mg. per cent. A blue reaction in tube No. 3 represented a blood glucose level of less than 186-mg. per cent but more than 162-mg. per cent. A blue reaction in tube No. 4 represented a blood glucose level of less than 217-mg. per cent but more than 186-mg. per cent. A blue reaction in tube No. 5 represented a blood glucose level of less than 260-mg. per cent but more than 217-mg. per cent.

In 9 instances, a colorless reaction occurred in all 5 reaction tubes, indicating a blood glucose concentration greater than 260-mg. per cent. In these cases, reaction tubes No's. 6 and 7 were prepared containing 4.0 cc. of distilled water and 0.4 cc. of the blood-water mixture in tube No. 6 and 0.3 cc. of the blood-water mixture in

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TABLE 1

COMPARISON OF RESULTS OBTAINED FROM BLOOD SPECIMENS ANALYZED FOR GLUCOSE CONTENT BY THE SOMOGYI-NELSON TECHNIC AND THE CLINITRON MULTI-INTERVAL BLOOD GLUCOSE METHOD USING TABLET 3A

Case Number	Concentration	Tube 1 130 to 144- mg. %	Tube 2 144 to 162- mg. %	Tube 3 162 to 186- mg. %	Tube 4 186 to 217- mg. %	Tube 5 217 to 260- mg. %	Tube 6 260 to 325- mg. %	Tube 7 325 to 433- mg. %
1	218	C	C	C	B	B		
2	209	C	C	C	B	B		
5	230	C	C	C	C	B		
8	187	C	C	B	B	B		
19	130	B	B	B	B	B		
4	184	C	C	B	B	B		
8	290	C	C	C	C	C	C	B
9	256	C	C	C	C	B		
1	269	C	C	C	C	C	B	B
9	264	C	C	C	C	C	B	B
14	240	C	C	C	C	B		
16	250	C	C	C	C	C	B	B
6	183	C	C	B	B	B		
7	128	B	B	B	B	B		
8	230	C	C	C	C	B		
20	280	C	C	C	C	C	B	B
22	141	B	B	B	B	B		
23	290	C	C	C	C	C	B	B
1	275	C	C	C	C	C	B	B
4	235	C	C	C	C	B		
5	180	C	C	B	B	B		
8	240	C	C	C	C	B		
16	262	C	C	C	C	C	B	B
1	214	C	C	C	B	B		
6	242	C	C	C	C	B		
8	257	C	C	C	C	B		
12	184	C	C	B	B	B		
20	268	C	C	C	C	C	B	B

Concentration = Actual blood glucose concentration in mg. % as determined by the Somogyi-Nelson technic.

Tube 1 = A blue reaction (B) in Tube 1 represents a glucose level within the increment of 130 to 144-mg. %.

Tube 2 = A blue reaction (B) in Tube 2 represents a glucose level within the increment of 144 to 162-mg. %.

Tube 3 = A blue reaction (B) in Tube 3 represents a glucose level within the increment of 162 to 186-mg. %.

Tube 4 = A blue reaction (B) in Tube 4 represents a glucose level within the increment of 186 to 217-mg. %.

Tube 5 = A blue reaction (B) in Tube 5 represents a glucose level within the increment of 217 to 260-mg. %.

Tube 6 = A blue reaction (B) in Tube 6 represents a glucose level within the increment of 260 to 325-mg. %.

Tube 7 = A blue reaction (B) in Tube 7 represents a glucose level within the increment of 325 to 433-mg. %.

tube No. 7. A blue reaction in tube No. 6 represented a blood glucose concentration of less than 325-mg. per cent but more than 260-mg. per cent. Finally, a blue reaction in tube No. 7 represented a blood glucose concentration of less than 433-mg. per cent but more than 325-mg. per cent.

Table 1 illustrates a comparison of results of those blood specimens with concentrations above 130-mg. per cent, analyzed by the conventional Somogyi-Nelson technic and the multi-interval blood glucose method, respectively. Blood specimens with a glucose concentration less than 130-mg. per cent were analyzed as follows:

A series of 5 reaction tubes containing 3.0 cc. of water was prepared. In a separate test tube, 1.0 cc. of blood was diluted with 9.0 cc. of water.

1.2 cc. of the blood-water mixture was added to tube 1.

1.4 cc. of the blood-water mixture was added to tube 2.

1.8 cc. of the blood-water mixture was added to tube 3.

2.2 cc. of the blood-water mixture was added to tube 4.

3.0 cc. of the blood-water mixture was added to tube 5.

Into each reaction tube, 1 *extra* tablet No. 1 and 1 *extra* tablet No. 2 were manually added. This provided the necessary additional precipitating reagents needed for the increase in the amount of blood used in these determinations. The reaction tubes were then placed in the Clinatron and processed with reagent tablet 3A. The first tube in the series showing a colorless reaction following a series of blue reactions was

TABLE 2

COMPARISON OF RESULTS OBTAINED FROM BLOOD SPECIMENS ANALYZED FOR GLUCOSE CONTENT BY THE SOMOGYI-NELSON TECHNIC AND THE CLINITRON MULTI-INTERVAL BLOOD GLUCOSE METHOD USING TABLET 3A

Case Number	Concentration	Tube 1 108 to 130- mg. %	Tube 2 93 to 108- mg. %	Tube 3 72 to 93- mg. %	Tube 4 59 to 72- mg. %	Tube 5 43 to 59- mg. %
5	50	B	B	B	B	C
15	70	B	B	C	C	C
22	94	B	C	C	C	C
4	52	B	B	B	B	C
21	48	B	B	B	B	C
10	62	B	B	B	C	C
8	82	B	B	C	C	C
6	62	B	B	B	C	C
24	51	B	B	B	B	C
1	60	B	B	B	C	C
17	48	B	B	B	B	C
26	64	B	B	B	C	C
15	69	B	B	B	C	C
23	75	B	B	C	C	C
24	43	B	B	B	B	B
26	99	B	C	C	C	C
6	79	B	B	C	C	C
21	80	B	B	C	C	C
14	48	B	B	B	B	C
15	84	B	B	C	C	C

Concentration = Actual blood glucose concentration in mg. % as determined by the Somogyi-Nelson technic.

Tube 1 = A colorless reaction (C) in Tube 1 represents a glucose level within the increment of 108 to 130-mg. %.

Tube 2 = A colorless reaction (C) in Tube 2 represents a glucose level within the increment of 93 to 108-mg. %.

Tube 3 = A colorless reaction (C) in Tube 3 represents a glucose level within the increment of 72 to 93-mg. %.

Tube 4 = A colorless reaction (C) in Tube 4 represents a glucose level within the increment of 59 to 72-mg. %.

Tube 5 = A colorless reaction (C) in Tube 5 represents a glucose level within the increment of 43 to 59-mg. %.

considered the end point. A colorless reaction in tube No. 1 represented a blood glucose level greater than 108-mg. per cent but less than 130-mg. per cent. A colorless reaction in tube No. 2 represented a level greater than 93-mg. per cent but less than 108-mg. per cent. A colorless reaction in tube No. 3 represented a level greater than 72-mg. per cent but less than 93-mg. per cent. A colorless reaction in tube No. 4 represented a level greater than 59-mg. per cent but less than 72-mg. per cent. Last, a colorless reaction in tube No. 5 represented a level greater than 43-mg. per cent but less than 59-mg. per cent.

Table 2 illustrates a comparison of results of those blood specimens below 130-mg. per cent analyzed by the conventional Somogyi-Nelson technic and the multi-interval blood glucose method, respectively. The Somogyi-Nelson procedure was used to obtain further confirmatory evidence to indicate that the rapid multi-interval blood glucose method is accurate and reliable within limitations defined in our previous paper.

COMMENT

For practical clinical purposes, knowledge that the actual blood sugar value falls within the proposed intervals is quite satisfactory for management of the diabetic patient, including the complications of acidosis and coma. As reported

previously,¹ when blood is processed for levels below 130-mg. per cent, the results are reported in smaller intervals because it is obviously desirable to obtain more specific results for lower blood glucose levels. It should be emphasized that only ten minutes was required to process all 10 of these patients' specimens. It required about ten minutes to process each set of the remaining blood specimens by the multi-interval method.

SUMMARY

The multi-interval blood glucose method was used in a summer camp comprised of 22 diabetic children. Each blood specimen was initially "screened" to determine if the actual value was above or below 130-mg. per cent. The 29 specimens having values above 130-mg. per cent were processed by both the multi-interval Clinatron method and the Somogyi-Nelson procedure. Comparisons of the data presented reaffirm the assertion that the multi-interval blood glucose method is speedy, accurate, and reliable within the limitations specified in the preceding paper.

The generous supply of Clinatron Reagent tablets supplied by Eli Lilly & Co., Indianapolis, Indiana, made this investigation possible.

REFERENCE

1. HAUNZ, E. A., and WEISBERG, J.: A multi-interval blood glucose method utilizing the Clinatron. *Diabetes* 5:297, 1956.

Transactions of the North Dakota State Medical Association

Seventy-First Annual Meeting

Minot, North Dakota, May 3, 4, 5, and 6, 1958

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Ninth District	A. R. GILSDORF, Dickinson
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Sixth District	C. H. PETERS, Bismarck

Terms expiring 1960

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JOHN MOORE	Grand Forks	E. P. BRYANT	Devils Lake
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<i>Committee on Medical Economics:</i>		C. W. HOGAN	Jamestown
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KEITH FOSTER	Dickinson	O. V. LINDELOW	Bismarck
W. A. WRIGHT	Williston	GLADYS MARTIN	Dickinson
CHARLES HEILMAN	Fargo	GORDON E. ELLIS	Williston
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J. H. MAHONEY	Devils Lake	JOHN FREEMAN, Chairman	Jamestown
<i>Committee on Rural Health:</i>		LEE CHRISTOFERSON	Fargo
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DOLSON PALMER	Cando	LORMAN L. HOOPES	Minot
R. E. HANKINS	Mott	P. R. BERGER	Grand Forks
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JOHN GILLAM	Fargo	R. M. FAWCETT	Devils Lake
Appointment expiring 1959		P. ROY GREGWARE	Bismarck
F. A. HILL	Grand Forks	MARTIN HOCHHAUSER	Garrison
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Appointment expiring 1960		W. H. WALL	Wahpeton
K. G. FOSTER	Dickinson	K. G. FOSTER	Dickinson
J. V. MILES, JR.	Jamestown	<i>Committee on Geriatrics and Rehabilitation:</i>	
SPECIAL COMMITTEES		T. H. HARWOOD, Chairman	Grand Forks
<i>Committee on Cancer:</i>		R. O. SAXVIK	Jamestown
C. M. LUND, Chairman	Williston	PAUL JOHNSON	Bismarck
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A. C. FORTNEY, Chairman	Fargo	<i>Committee on Emergency Medical Service:</i>	
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		ROBERT GILLILAND	Dickinson

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JAMES V. MILES, Jr.	Jamestown
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R. D. NIERLING	Jamestown
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G. H. HILTS	Cando
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Committee on School Health:

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M. H. POINDESTER	Fargo
G. N. VIGELAND	Rugby
J. P. MERRETT	Valley City
R. E. DORMONT	Minot
GLADYS MARTIN	Dickinson
JAMES V. MILES, Jr.	Jamestown
W. C. DAILEY	Grand Forks

Advisory Committee on Polio:

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GEORGE HART	Minot
A. E. CULMER, JR.	Grand Forks
C. W. HOGAN	Jamestown
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Representatives:	
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E. T. KELLER	Rugby
C. H. PETERS	Bismarck

Liaison Committee to the North Dakota Hospital Association:

Representative: R. O. SAXVIK	Jamestown
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Liaison Committee to the North Dakota State Bar Association:

Representative: PAUL JOHNSON	Bismarck
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Liaison Committee to the North Dakota Pharmaceutical Association:

Representative: G. A. DODDS	Fargo
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Liaison Committee to the Woman's Auxiliary to the North Dakota State Medical Association:

A. R. GILSDORF, Chairman	Dickinson
R. H. WALDSCHMIDT	Bismarck
R. W. RODGERS	Dickinson
O. A. SEDLAK	Fargo
E. H. BOERTH	Bismarck

Liaison Committee to the North Dakota State Dental Association:

Representative: DAVID JAEHNING	Wahpeton
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Liaison Committee on Public Information:

Representatives:	
MARLIN JOHNSON	Bismarck
H. L. REICHERT	Dickinson

Commission for the Improvement of Patient Care in North Dakota:

Representatives:	
A. R. GILSDORF	Dickinson
R. O. SAXVIK	Jamestown

Medical Center Advisory Council:

Member: P. H. WOUTAT	Grand Forks
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Governor's Health Planning Committee:

Member: P. H. WOUTAT	Grand Forks
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State Health Council:

Members:

M. S. JACOBSON	Elgin
R. F. GILLILAND	Dickinson

REFERENCE COMMITTEES

1. To consider reports of President, Secretary, Executive Secretary, and Treasurer:

J. H. MAHONEY, Chairman	Devils Lake
FRED ERENFELD	Minot
A. K. JOHNSON	Williston
MILTON NUGENT	Bismarck
WELDE FREY	Drayton

2. To consider reports of the Council, Councillors, and Special Committees:

R. M. FAWCETT, Chairman	Devils Lake
W. L. MACAULAY	Fargo
ROBERT GILLILAND	Dickinson
EDMUND VINJE	Hazen
V. J. FISCHER	Minot
W. P. TEEVENS	Grafton

3. To consider reports of the Delegate to the A.M.A., Medical Center Advisory Council, and Committee on Medical Education:

KEITH FOSTER, Chairman	Dickinson
R. B. TUDOR	Bismarck
R. W. MCLEAN	Hillsboro
R. E. MAHOWALD	Grand Forks
J. S. GILLAM	Fargo

4. To consider reports of Standing Committees, except Committee on Medical Education and Committee on Medical Economics:

A. F. HAMMARGREN, Chairman	Harvey
A. R. SORENSON	Minot
G. L. COUNTRYMAN	Grafton
E. J. BEITHON	Wahpeton
JOHN VAN DER LINDE	Jamestown

5. To consider reports of Committee on Medical Economics, including Committee on Veterans Medical Service, Committee on Prepayment Medical Care, and Committee on Rural Health:

CARL BAUMGARTNER, Chairman	Bismarck
ARTHUR C. BURT	Fargo
G. CHRISTIANSON	Valley City
FRANK MELTON	Fargo

6. Committee on Resolutions, to Include New Business:

T. E. PEDERSON, Chairman	Jamestown
F. A. DE CESARE	Fargo
R. W. HENDERSON	Bismarck
F. D. NAEGELI	Minot
ROBERT PAINTER	Grand Forks

7. Committee on Credentials:

JOHN S. GILLAM, Chairman	Fargo
FRED ERENFELD	Minot

PROCEEDINGS OF THE HOUSE OF DELEGATES of the North Dakota State Medical Association Seventy-First Annual Meeting

The First Session of the House of Delegates of the North Dakota State Medical Association was called to order by the Speaker of the House, Dr. G. A. Dodds, at 4:00 P.M. at the Clarence Parker Hotel, Minot, May 3, 1958.

Dr. John S. Gillam of Fargo, chairman of the Credentials Committee, reported that there was a quorum present and all credentials were in order.

Secretary Boerth called the roll. The following doctors were present:

Arthur C. Burt, Fargo; Frank M. Melton, Fargo; W. L. Macaulay, Fargo; F. A. DeCesare, Fargo; John S. Gillam, Fargo; E. J. Beithon, Wahpeton; D. G. Jaehning, alternate, Wahpeton; R. M. Fawcett, Devils Lake; J. H. Mahoney, alternate, Devils Lake; Robert Painter, Grand Forks; G. L. Countryman, Grafton; R. E. Mahowald, alternate, Grand Forks; W. P. Teevens, Grafton; Welde Frey, alternate, Drayton; V. J. Fischer, Minot; A. R. Sorensen, Minot; F. D. Naegeli, Minot; A. F. Hammargren, Harvey; G. Christianson, Valley City; C. J. Klein, alternate, Valley City; R. W. Henderson, Bismarck; Milton Nugent, Bismarck; R. B. Tudor, Bismarck; Carl Baumgartner, Bismarck; Edmund Vinje,

Hazen; T. E. Pederson, Jamestown; John Van der Linde, Jamestown; A. K. Johnson, Williston; Robert Gilliland, Dickinson; Keith Foster, Dickinson; R. W. McLean, Hillsboro; and Mervin Rosenberg, alternate, Northwood.

There were 32 delegates present.

The following also attended the meeting of the House of Delegates:

Drs. R. W. Rodgers, L. W. Larson, R. H. Waldsemidt, J. C. Fawcett, R. D. Nierling, A. R. Gilsdorf, J. D. Craven, C. W. Toomey, V. G. Borland, N. A. Youngs, C. H. Peters, D. J. Halliday, K. G. Vandergon, C. M. Lund, O. A. Sedlak, and Mr. Lyle A. Limond.

Speaker Dodds instructed the alternate delegates to assume their place on the reference committee to which their delegate was assigned. Dr. Mahoney was asked to assume the chairmanship of committee No. 1 to replace Dr. Fox.

The motion was made, seconded, and passed that the reading of the minutes be dispensed with and that they be accepted as printed in *THE JOURNAL-LANCET*.

Motion was made, seconded, and passed that the reading of the reports of the president, secretary, executive secretary, and treasurer be dispensed with and that they be referred to the proper reference committee, No. 1.

REPORT OF THE PRESIDENT

During the past year, the activities of your state association have been many and varied. Detailed information is available in the handbook reports. Space and time do not permit a recapitulation of all the work, so my remarks will be confined to a few items, which are felt to be most important.

It was a pleasure to be invited to visit the Southwest, First, Northwest, Devils Lake, Sixth, Stustman, and Grand Forks District Society Meetings, and I wish to thank them for their cordial reception. These meetings were all well attended and excellent programs were given. One cannot but note, however, that there is too little interest by the general membership in the affairs of our association and too much apathy and lack of knowledge about state and national legislation directly affecting our profession. Increased effort must be made to inform and stimulate more interest and activity. The practice of having the delegates report the transactions of the annual meeting to their local societies is a distinct help and should be made mandatory. Freedom is not something to be won once and for all but is a continuing battle for all time.

In September, the National Conference on Public Relations held in Chicago was attended by your state chairman on Public Relations (Dr. John Cartwright), the executive secretary, and myself. It is unfortunate that this meeting cannot be attended by every physician, thereby better acquainting them with the vital importance of this very important subject. We must individually and collectively exert continuous effort, intelligently directed, so that the public may have an insight into the problems of our profession and an appreciation of our aims and performance.

Throughout the summer of 1957, considerable countrywide hysteria developed regarding an epidemic of "Asian Flu." The A.M.A.'s recommendation for formation of district society committees on "Asian Flu" was followed. On September 22, I attended a joint meeting in Bismarck of the North Dakota State Health Council and the Public Health Committee of the state medical association. A definite plan was formulated should the epidemic strike North Dakota. Methods for vaccine distribution were agreed upon, and releases to the press were aimed to inform rather than alarm the public. Fortunately, this epidemic failed to materialize.

On November 9, 1957, I attended the meeting of the

Advisory Council on Crippled Children's Services in Bismarck. Among other items, the resolution presented by the Devils Lake Society to the House of Delegates regarding expansion of Crippled Children's Services was discussed. Many misconceptions of both sides were cleared away, and I am sure we now have a much better understanding. The necessity for careful evaluation of economic need was emphasized, rather than leaving the impression of an open invitation for free medical care. The role to be played by the family physician in requesting services was stressed. Several acute non recurring conditions, which had previously come under the program, were excluded.

Blue Shield had a very successful year. Enrollment is up over 25 per cent. The cash reserves are at a very satisfactory level and are steadily improving. The 10 per cent which was temporarily withheld from the physician's payment has been repaid. More doctors are participating, and professional relationships are much improved. On February 3, 1958, I had the pleasure of attending the Blue Shield Public Relations meeting in Chicago with Dr. Frank DeCesare of Fargo, Mr. Eagles, and our own executive secretary. Many excellent papers were presented with the keynote of service to the profession and the public. Repeatedly, emphasis was placed on the necessity for understanding the mutual problems of the public, the doctor, and Blue Shield. We must continue to educate our members and the public of the philosophy behind prepayment medical care. Blue Shield, the backbone of this plan, alone stands between a free practice and government medicine. The plan in North Dakota is fully under the control of physicians. The state society is now officially represented on the board of directors. Consideration should be given to having the House of Delegates officially approve the Blue Shield schedule. On January 24, I attended the first annual news conference of the North Dakota Hospital Association in Fargo. The reason for the 30 per cent increase in Blue Cross rates was explained. The rising cost of hospitalization is of deep concern to every physician. We deem expanding benefits for outpatients' care a threatened intrusion into medical practice. This problem was discussed at the Blue Shield-Blue Cross Liaison Committee meeting held in Fargo on March 8. As a guest representing the state association, I expressed our concern regarding outpatient benefits already incorporated in the new Blue Shield contract, which benefits had been added without consultation with the medical profession. It was agreed that no further benefits would be added until they had been discussed by the Liaison Committee.

An innovation for selecting committee members was introduced this year. Members of the association were sent questionnaires requesting that each physician indicate the committee in which he was most interested and to signify willingness to work on such committee. It was indicated that failure to reply would denote no interest in appointment to any committee. Those failing to reply were not appointed. Many younger physicians displaying interest were chosen. This questionnaire was of great assistance in committee selection. The committees this year have worked well, and I wish to thank the various chairmen and members for their untiring efforts. You will note that the Economic Committee, among other things, has adopted the relative value fee schedule and are renegotiating fee schedules with several agencies—Workmen's Compensation, Welfare Board, Indian Affairs, and Veteran's. They have also studied and initiated an excellent group insurance policy.

In January 1958, your negotiating team went to Washington, where the Medicare contract was renegotiated with the Department of Defense at, again, a very satisfactory level. This was accomplished by adequate preparation on the part of the negotiating team. Prior to going to Washington, it had met twice in Minneapolis with representatives of the 5 other states of the North Central Conference and had attended the Medicare Conference held by the A.M.A. immediately following the interim session in Philadelphia. The Army expressed deep appreciation for the conduct of the plan by North Dakota physicians, where the average "per case" cost was quite low. The wisdom of having an unpublished maximum schedule, which allows the physician to charge his usual, customary, equitable fee has been fully justified. The experience of states which published the fee schedule confirms this point of view. I wish to commend Dr. C. H. Peters of Bismarck for his invaluable work.

There was no State Legislative Assembly this year, but there is important national legislation. Particularly important is the Forand bill, HR-9467, which would provide free hospitalization for sixty days, free nursing home care for sixty days, and free surgery (by the Board of Certified Surgeons or F.A.C.S. members only) to every recipient or those eligible for social security. The social security tax would be raised by ½ per cent for the employees, ½ per cent for the employers, or ¾ of a per cent for the self-employed, raising the tax base from the present \$4,200 to \$6,000. This bill has serious implications, and has much popular appeal. It would cover between 11½ and 13 million people. It represents merely another inroad by socialism and a further invasion of the free practice of medicine. We must marshal our forces and enlist all friends of the free enterprise system to defeat it. The voluntary prepayment plans must formulate a way for the care of the elderly patient.

This year, ruthless attempts by officials of the United Mine Worker's Welfare Fund to designate the physicians who shall provide medical care for beneficiaries of the Welfare Fund have been evident in North Dakota. If we permit this to continue, other agencies may be encouraged to adopt the same policy. It is mandatory that the local societies and the state association recognize the evil of the third party intrusion into the private practice of medicine and institute a definite program to combat it. The patient's right of free choice of a physician must be maintained.

Under the excellent administration of Dr. Loeb, the most modern and advanced methods of treating tuberculosis have been instituted at our State Sanatorium. This has so reduced the patient load that he now feels that continuation of such large sanatorium facilities are uneconomical and that this institution might be more profitably used for the care of other medical conditions and suggests transferring tuberculosis patients to a more advantageous location. Our membership should be fully informed of all the facts. We all must realize that while the number of tuberculous patients has been markedly reduced, we are still faced with the problem of caring for those who are afflicted with this disease. It is our duty to see that a proper and equitable solution to this problem is accomplished.

Both the public and the profession are again deeply indebted to Dr. Carroll Lund, who for years has continued his tireless effort in furthering cancer education. A Cancer Caravan again traveled throughout the state with a superlative program. If present plans materialize, a Cancer Registry will eventually be established in every hospital in the state.

Donations to the American Medical Education Foundation are still far below an acceptable level. Too many members of our association have not yet been convinced that it is not only their privilege but their duty to make an annual donation to the medical schools of America. Our aim must be to enlist 100 per cent participation by our membership. While compulsion is contrary to our belief, nevertheless, we might seriously follow the lead of several other states and make this contribution part of the state dues.

At the request of Dr. Myers, editor of THE JOURNAL-LANCET, the Committee on Scientific Program was asked to request each speaker at our annual session to supply a copy of their papers. Publication of these excellent papers will improve our official publication.

I very definitely feel that we are failing to utilize the abilities of our president-elect and our first and second vice-presidents. These offices should be given more responsibility, and perhaps their duties could be definitely spelled out. This would not only relieve the president of much time-consuming travel but would better prepare his successors for the offices they will eventually assume.

To the many members who have unselfishly devoted so much of their time and effort to the conduct of our affairs, I wish to extend my personal thanks and gratitude. Their interest, loyalty, and devotion have made the work of this office during the past year a great pleasure. Finally, but by no means last, I wish to express my most sincere appreciation and thanks to our very efficient executive secretary, Mr. Lyle Limond, for his invaluable help and counsel during the past year. His devotion to the welfare of organized medicine and to our own state organization is deeply appreciated. It has been a privilege and an honor to represent you at many state and national meetings, and I am deeply grateful for the opportunity. If I have been able to serve you in some small way, I am happy indeed.

R. W. RODGERS, M.D., President

SECRETARY'S REPORT

MEMBERSHIP: The total membership for 1957 was 428. Of this number, 395 paid the regular membership fee, 9 were on a retired or limited basis and 18 were honorary members. Six members were carried on a complimentary basis due to military service and age. Seven members passed away during the year, and several have left the state. New members, however, are being steadily added to our roster.

Table 1 shows the annual membership for the past five years.

TABLE 1
COMPARISON OF ANNUAL MEMBERSHIP

	1953	1954	1955	1956	1957
Paid memberships	368	378	387	380	395
Honorary memberships	12	15	14	16	18
Retired and limited		12	12	12	9
Dues cancelled, military service and age exemption	16	6	3	8	6
Total	396	411	416	416	428

Table 2 shows the annual dues for 1958, which have been coming in very slowly. There is still a very large number of members who have not as yet paid their 1958 dues, and the district medical society secretaries and councillors are urged to use every possible means to collect the dues of these delinquent members.

TABLE 2

	April 10 1954	April 8 1955	April 19 1956	May 1 1957	April 15 1958
Paid-up members	323	323	334	328	313
Honorary members	13	14	16	18	16
To be honorary	4	3	6	2	3
Dues cancelled, military service	4	3	5	5	3
Limited	1	1	1		
Retired	7	7	6	7	3
Complimentary			1		1
Total	352	351	369	360	339

STATE ASSOCIATION MEMBERSHIPS

1957:					
	Regular	Retired	Limited	Comp.	Honorary
First	86			2	3
Second	27				2
Third	64			2	3
Fourth	60		1		4
Fifth	7				1
Sixth	65	2	1	1	3
Seventh	30	1			2
Eighth	20				
Ninth	27	3			
Tenth	9	1		1	
Total	395	7	2	6	18

1958:					
	Regular	Retired	Limited	Comp.	Honorary
First	75				2
Second	16				2
Third	59			2	3
Fourth	34			1	3
Fifth	6				1
Sixth	50	1			4
Seventh	29	1			1
Eighth	14				
Ninth	23	1			
Tenth	7			1	
Total	313	3		4	16

A.M.A. GENERAL MEMBERSHIPS

	1957	1958
First	88	74
Second	29	18
Third	68	63
Fourth	65	39
Fifth	8	7
Sixth	70	52
Seventh	33	31
Eighth	20	14
Ninth	28	24
Tenth	11	8
Total	420	330

None of the societies show paid-up membership rosters for the current year and have forwarded only partial reports. This is particularly noticeable in the larger districts. The Constitution and Bylaws of the North Dakota State Medical Association states that such dues should be forwarded to the state office not later than March 1 of the current year. It should be noted that although March 1 is the stipulated date for receipt of

dues, this report is shown as April 15 to give an up-to-date picture of paid memberships.

The secretary has kept in touch with the operations of the state office and wishes to commend Mr. Limond and Mrs. Fremming for their cooperation in these matters of membership.

E. H. BOERTH, M.D., Secretary

EXECUTIVE SECRETARY'S REPORT

MEETINGS: Your executive secretary attended several state, regional, and national meetings in behalf of the association and made many personal contacts with individual physicians, newspaper editors, legislators, radio and television personnel, hospital administrators, nurses, attorneys, dentists, and others.

I was able to attend at least 1 meeting in 6 of the 10 district medical societies.

It is still felt, as has been reported in past years, that some of the committees are not too active. Your state office continues to aid in the work of those committees which are active. Your executive secretary was present at all but 1 committee meeting. It is again suggested that committee meetings be held in the fall or early winter months.

STATE OFFICE: Your headquarters office is continuing in its efforts to be of even greater service to the total membership, to public and private health agencies, and to the public in general.

The Medicare program and its inherent problems is an example of the added work load of this office.

Mrs. G. K. Fremming (Margaret) continues to give fine service as office secretary.

As you all should know, it is from here that the membership Newsletter and the auxiliary Newsletter is processed, the Physicians' Placement Bureau functions, the State Board of Medical Examiners' annual license renewals are handled, Medicare claim forms are processed, committee meetings are arranged and members notified, annual association and A.M.A. dues are processed, disbursement of Uniform Insurance Reporting forms is recorded, and the affairs of the North Dakota Heart Association are guided, plus many other duties to numerous to continue listing.

LEGISLATION: There was no action on the state level, since this has not been a year for our legislature to meet. On the national level, however, we are being confronted by the inherent dangers found in the Forand bill (HR-9467). The purpose of this bill is to amend the Social Security Act and the Internal Revenue Code so as to increase the benefits payable under the federal old-age survivors and disability insurance program and to provide insurance against the costs of hospital, nursing home, and surgical service for persons eligible for old-age and survivors insurance benefits.

The Jenkins-Keogh bills are back and should be given support by the self-employed if they are interested in getting up retirement plans by deducting from *gross income* their annual contributions to such plans.

PHYSICIANS' PLACEMENT SERVICE: Twenty-seven North Dakota communities and 9 physicians or groups are on file in this office in regard to a request for a physician and/or additional physicians.

The 27 communities seeking a physician or an additional physician are: Anamoose, Belfield, Bowman, Buffalo, Finley, Flasher, Fordville, Glen Ullin, Grenora, Hankinson, Hebron, Killdeer, Larimore, McClusky, McHenry, Mandan, Medina, Minnor, Napoleon, New England, Page, Pembina, Richardton, Rutland, Sharon, Strasburg, and Watford City. The 6 towns of those listed

having a physician but wanting 1 or more are: Bowman, Hebron, Mandan, Napoleon, and Richardson.

U.N.D. MEDICAL SCHOOL SCHOLARSHIPS: The 1957 winners of the association's scholarship prizes, totaling \$500, offered at the School of Medicine were: anatomy, Robert Geston and Rollin W. Pederson (equal); physiology and pharmacology, Richard L. Rohde; microbiology, Ione E. Dzibur; pathology, Donald G. McIntyre, and first year, Follin W. Pederson.

FINANCE: The treasurer's report continues to show an improved balance. The goal of having one year's operating budget in reserve is being maintained as it should be in the interests of good business practice.

Receipt of dues continued to be slow as in years past as will be noted in the following chart:

<i>District society</i>	<i>Number of unpaid members</i>
First	16
Second (Devils Lake)	13
Third (Grand Forks)	11
Fourth (Northwest)	28
Fifth (Sheyenne)	1
Sixth	19
Seventh (Stutsman)	1
Eighth (Kotana)	6
Ninth (Southwestern)	3
Tenth (Traill-Steele)	3
	101

Of the 101 members who have not paid, 94 are regular members.

MEDICARE: The Dependents' Medical Care Program (Medicare) commenced on December 7, 1956. Up to February 1, 1958, 710 claims had been processed by this office.

The total sum paid to North Dakota physicians as of January 31, 1958 is \$47,156.

Each claim for services rendered averages roughly \$66.42.

Please read Dr. C. H. Peters' report concerning the negotiations of our new Medicare contract. These negotiations took place in Washington, D.C., during January 1958.

Claim forms are still being sent to this office in an incomplete state. It is requested that ordinary care be exercised in having the forms filled out properly.

THOUGHTS FOR THE FUTURE:

1. Continued support should be given the State Health Department, and particularly so, during the 1959 legislative session.

2. The formation of legislative committees at the district medical society level should be seriously considered by the 10 component medical societies.

3. Consideration should be given to having some of our association members visit the legislators during the 1959 legislative session, even though we are not supporting or opposing any bills at the time of the visitations.

ACKNOWLEDGMENTS: Your executive secretary wishes to express his sincere appreciation to our president, Dr. R. W. Rodgers, for his efforts in behalf of this association. Dr. Rodgers was ever willing to leave his busy practice to attend district society meetings and other meetings of importance to the association.

My sincere thanks also go to those other members

with whom this writer has had occasion to work during this past year in the association's several programs.

LYLE A. LIMOND, Executive Secretary

Motion was made, seconded, and passed that the reading of the reports of the council, councillors and special committees be dispensed with and that these be referred to reference committee No. 2 for its consideration.

Motion was made, seconded, and passed that the reading of the reports of the delegate to the A.M.A., representative to the Medical Center Advisory Council, and Committee on Medical Education be dispensed with and that these be referred to reference committee No. 3 for its consideration.

Motion made, seconded, and passed that the reading of the reports of the standing committees be dispensed with and referred to reference committee No. 4 for consideration.

Motion made, seconded, and passed that the reading of the reports of the Committee on Medical Economics, Committee on Veterans Medical Service, Committee on Prepayment Medical Care, and Committee on Rural Health be dispensed with and referred to reference committee No. 5 for consideration. At this time, Dr. Dodds advised Dr. Baumgartner, chairman of this reference committee, to also consider the report of Dr. Peters, which appears in the back of the Handbook on Development of Fee Schedule.

REPORT OF THE CHAIRMAN OF THE COUNCIL

The Council of the North Dakota State Medical Association had its regular spring meetings May 25 and 26 at the Gardner Hotel, Fargo, at the time of the annual state medical meetings. There were no special meetings of the council in 1957. The regular interim meeting was held December 14, 1957, at the Gardner Hotel, Fargo.

Council meeting held May 25, 1957 at the Gardner Hotel, Fargo — Dr. C. H. Peters reported on the progress of the Medicare program since December 7, 1956. Several complaints had been received from individual doctors and several of the medical societies. Dr. C. H. Peters and Dr. R. H. Waldschmidt stated that these parties had been contacted and that better satisfaction was attained after explanation in more detail regarding the Medicare program. Dr. Peters, who was very instrumental in drawing up the financial aspect of the Medicare program, volunteered to appear before the House of Delegates or any reference committee to explain the Medicare program to date.

Dr. R. H. Waldschmidt, as president of the North Dakota State Medical Association, recommended that the association be represented directly on the board of directors of Blue Shield. This recommendation was carried out in later council meetings. Dr. Waldschmidt emphasized the importance of the councillors and delegates reporting the activities of the state medical society to the individual district societies. He also suggested that the Committee on prepayment Medical Care and the Committee on Medical Economics formulate a unit plan for the care of welfare patients and also to consider revising the fee schedule for the Workmen's Compensation Bureau, which he feels is too low.

Dr. Waldschmidt then spoke on the seventy-fifth anniversary medical meeting, which will be held in 1962. This meeting will be held jointly with South Dakota, requiring special hotel and general facilities. The meeting point should also be as close as possible to our South Dakota neighbors. After much discussion, a motion was made and seconded that Bismarck be designated the meeting place for the seventy-fifth anniversary. The

motion was passed. The secretary of the council was instructed to convey the motion to the House of Delegates, recommending that Bismarck be the meeting place for 1962. Dr. W. A. Wright recommended that if the state association wanted the current president of the American Medical Association to give the anniversary address, an invitation be extended to him as soon as he is selected president-elect.

Dr. K. G. Vandergon reported on the progress of the revision of the *History Medical Milestones* and stated that very little had been done since the last council meeting. It was decided that a committee had handicaps in editing this book, and Dr. James Halliday consented to be chairman of the committee with the responsibility of editing the book and having it printed. The council voted him a free hand in this difficult problem. A motion was passed regarding "Agreement of Understanding" between the North Dakota State Medical Association and the State Board of Medical Examiners with the North Dakota Hospital Association. A motion was passed that the president of the state medical association appoint 3 members of the association and 2 members of the board of medical examiners to a committee to meet with the hospital association.

Dr. E. J. Larson, treasurer of the state association, moved that \$15,000 of the Association's funds be invested in government bonds. The motion was seconded by Dr. Borland and passed.

The second session of the council was held May 26, 1957, at the Gardner Hotel, Fargo. A letter written to Mr. Lyle Limond was read by the secretary of the North Dakota State Dental Association requesting a liaison committee between the North Dakota State Medical Association and the North Dakota State Dental Association. It was moved and seconded that the president appoint this liaison committee with the North Dakota Dental Association. Motion passed.

A resolution from the Devils Lake District Medical Society, which was presented to the House of Delegates and passed at their second session, was referred to the council for some action. Delegates present at the time of this council meeting stated that the resolution was referred to the council in order to have the council impress upon the Crippled Children's Bureau that no more items should be added to the program. After much discussion, a motion was made, seconded, and passed that the chairman of the council, Dr. A. R. Gilsdorf, communicate with the executive director of the State Welfare Board on this matter. The results of these communications will be brought out later in this report.

A motion was made and passed that this association turn over the Medicare program administration to the Wisconsin State Medical Society to deal with the government on our contract. The Wisconsin society is better equipped to carry out this administration than the North Dakota association. The California Physician's Service Blue Shield wrote to Dr. C. H. Peters requesting a copy of our Medicare fee schedule. We decided not to send it to them, but, upon the advice of Dr. Peters, an explanatory letter was sent to that organization by Mr. Lyle Limond.

Chairman of the council, Dr. A. R. Gilsdorf, appointed Dr. V. G. Borland and Dr. Keith Vandergon as 2 members to serve on the Blue Shield board of directors with the speaker of the House of Delegates, Dr. G. A. Dodds. These appointees were specifically made to fulfill the request of Dr. Waldschmidt, as noted under the report of the council meeting of Saturday, May 25, 1957.

After much discussion, a motion was made, seconded, and passed that the council suggest to the district med-

ical societies that the Tuesday evening dinner at the annual meetings be discontinued, as attendance was not good and it was a burden to society members in the towns in which the meetings were held and that these dinners did not serve a sufficiently useful purpose to be continued.

Election of officers was held and the following doctors were elected unanimously: A. R. Gilsdorf, chairman of the council; R. D. Nierling, vice-chairman; and W. H. Gilsdorf, secretary.

The executive committee of the council will consist of these 3 officers.

The next interim meeting was set for December 7, 1957, at the Gardner Hotel, Fargo.

As previously stated, the chairman of the council, on the recommendation of the House of Delegates and the council, corresponded with the Public Welfare Board of North Dakota regarding the Crippled Children's program.

On May 26, 1957, the chairman of the council, Dr. A. R. Gilsdorf, wrote to Carlyle D. Onsrud, executive director of the State Welfare Board at Bismarck. The Devils Lake District Medical Society's resolution voicing its objection to expanding the Crippled Children's program was quoted to Mr. Onsrud. Following a one-page explanation regarding the action of the House of Delegates and the council, the letter was finished with the following remarks, "May we suggest that the State Welfare Board Committee on Crippled Children meet jointly with the Committee on Crippled Children of the North Dakota State Medical Association and review this problem." It is to be noted that this correspondence is in regard to a directive of the Public Welfare Board of North Dakota dated December 20, 1956, signed by Paul L. Johnson, M.D., acting medical director of the Crippled Children's Services.

On June 6, 1957, I received a letter from Carlyle D. Onsrud in answer to my letter of May 26. Mr. Onsrud's letter imparted a feeling of desire for helpful cooperation. Extracted from his one-page letter was the following, "We welcome a session on the subject matter you enumerated between the administrative and professional advisory personnel of the State Welfare Board and your Association on the Crippled Children's Program. Perhaps you and your Association could suggest an appropriate date for this conference."

I received a letter written by Grover D. Icenogle, M.D., dated June 10, 1957, acknowledging the receipt of the copy of the letter to Mr. Onsrud and noting that he would further discuss the matter. During this interim from the time of the directive of December 20, 1956, signed by Paul L. Johnson, M.D., Dr. Icenogle was appointed medical director of the Crippled Children's Services.

This was the last official correspondence of the chairman of the council regarding the Crippled Children's program, but further correspondence and meetings were held between the present North Dakota State Medical Association president, Dr. R. W. Rodgers, and the members of the Crippled Children's Bureau. Apparently, a more satisfactory understanding has been reached between the Crippled Children's Bureau and the state association.

The regular interim meeting date was changed from December 7 to December 14, 1957, because of other national medical meetings. This meeting was also held in the Gardner Hotel, Fargo. Dr. W. H. Gilsdorf of Valley City, secretary of the council, died September 20, 1957. A motion was made and carried that Dr. C. H. Peters be appointed secretary, and a motion was carried

that Dr. Gunder Christianson succeed the late Dr. Walter Gilsdorf to the council.

Mr. Oscar Hanson of Grand Forks, general agent for the Union Central Life Insurance Company, spoke concerning the group life insurance proposal for the members of the North Dakota State Medical Association. It was stated that the number of our members required to put the policy in force was 100, and 25 were required in order to keep the policy in force. Members of the council felt that the program of this company was commendable and it could be recommended to association members. Mr. Hanson then offered to send brochures to each doctor of the state society.

Mr. James Dixon and Mr. Ed Boerth of Fargo presented a proposal for a professional liability (malpractice) insurance program. In the discussion on this malpractice program, it was noted that a group policy is less expensive. Minimum members required would be 100. Maximum protection for an individual would be \$100,000 to \$300,000. In groups, it would be \$100,000 to \$600,000. The membership of the North Dakota State Medical Association would have to be surveyed for acceptability, and a claims committee would be needed. Messrs. Dixon and Boerth of Insurance, Inc., Fargo, would cooperate in the survey by supplying small policies and brochures. The council felt that the president of the North Dakota State Medical Association could appoint a claims committee in cooperation with Messrs. Dixon and Boerth. The council in general felt that such an approach to malpractice insurance is good and we favored further action by Messrs. Dixon and Boerth.

Dr. Halliday reported on his personal survey of the book, *Medical Milestones in North Dakota*, and stated that many gross errors were found. He further stated that the book would have to be rewritten. It was decided that a new start be made on the book and to have it ready for the seventy-fifth anniversary meeting.

A motion was carried to deny exhibit space request by a Minot chiropodist for the 1958 meeting.

The council clarified the wording of the motion made and carried at the December 1956 interim meeting regarding charges for the Sunday night "Mixer" included as part of the annual meetings. The clarification is as follows: "Each physician is to be charged \$5.00 to attend the "Mixer" and his lady is also to be charged \$5.00. Exhibitors (both scientific and technical), guest speakers, and employees of the North Dakota State Medical Association are to be guests of the association."

The council approved a motion that the Committee on Geriatrics and Rehabilitation act as an advisory committee to the Rehabilitation Unit at the University of North Dakota.

The motion was carried that a small committee be appointed to act as an advisory committee to a Sheltered Workshop to be built in Jamestown by the North Dakota Society for Crippled Children and Adults (Easter Seal Society).

A motion was carried that prizes of \$50, \$25, and \$10 be underwritten by the association for the A.A.P.S. essay contest. The prize money is to be charged to the Public Relations Budget.

Dr. Peters spoke on the coming renegotiation of the Medicare contract. The contract is not to be signed until members of the executive committee give their approval. Dr. Peters moved and Dr. Waldschmidt seconded that the fiscal agent for the North Dakota State Medical Association, under the Medicare contract, should continue to be the State Medical Society of Wisconsin. Motion carried.

Discussions were brought out by Dr. D. J. Halliday and our president, Dr. R. W. Rodgers, regarding the United Mine Workers and their attitude toward the private practice of medicine. It was suggested that the local district medical societies might wish to invite a representative of the United Mine Workers to discuss these problems with the membership.

Our president, Dr. R. W. Rodgers, spoke on the Forand bill, the A.M.E.F., and other items of interest.

The proposed budget for 1958 was, at this time, approved by the council.

It is to be noted that the budget appears to be less because of the reduced figure under Committee on Necrology and Medical History. This does not mean, however, that the total operating expense of our association has dropped, but that the delay in publication of *Medical Milestones* has temporarily held up the expenditure of this money. We must keep our budget high and our cash reserves high because of unexpected expenses relating especially to the committees on Public Relations and Legislation as well as any change that may come up at the time of publication of our book.

The president of the association, Dr. R. W. Rodgers, contacted the chairman of the council, Dr. A. R. Gilsdorf, on February 17, 1958, regarding the problem involved in the possible closing of the North Dakota Sanatorium for Tuberculosis at Dunseith. Dr. Rodgers thought that the association could not wait for the annual spring meeting to make a decision as to whether or not there should be an additional survey of the tuberculosis situation within our state. The closing paragraph of Dr. Rodgers' letter to Dr. Gilsdorf is as follows:

"In view of this expression of opinion by so many members of our State Medical Association, I believe, that as the official body of the North Dakota State Medical Association, it becomes our duty to make a request to the United States Public Health Service that a definite survey of our State's needs, in regard to this problem, be made at the earliest possible date, requesting that they submit recommendations as to: (A) What present and future facilities will be needed for the adequate and proper care of patients afflicted with tuberculosis. (B) Where such facilities would most profitably be located. Therefore, Dr. Gilsdorf, I would recommend that you contact the members of the Council, presenting the problem to them and requesting what action they wish to take regarding the request for such a survey.

Very truly yours,
R. W. RODGERS, M.D., President"

In response to Dr. Rodgers' letter, the chairman of the council sent an explanatory letter to each member of the council with a request for his vote and opinion. A majority vote by the council was received, indicating that further survey was desired. This information was passed to Dr. Rodgers who took further action on this problem. At the time of writing this report, no definite decision has yet been made as to how North Dakota will house the patients if Dunseith's sanatorium is closed.

Dr. Nierling moved and Dr. Toomey seconded that the North Dakota State Medical Association offer its cooperation to the Division of Vital Statistics of the State Health Department on a survey dealing with cancer deaths thought to be due to cancer of the lung caused by smoking. Motion was carried.

A. R. GILSDORF, M.D.,
Chairman of the Council

REPORTS OF COUNCILLORS

First District

The First District Medical Society held 9 meetings during 1957. All meetings were held in the Town Hall of the Gardner Hotel. The following officers were elected for the year: president, Dr. R. D. Weible; vice-president, Dr. L. G. Pray; and secretary-treasurer, Dr. A. L. Klein.

Dr. A. C. Burt requested and the society approved a cancer registry program for St. John's Hospital. Mr. Donald Eagles gave a report on Blue Cross and Blue Shield, discussing their programs and plans for the future. The scientific portion of the program was presented by Dr. Bailey, consultant in neurology at the Mayo Clinic, on "Convulsive Disorders."

Dr. R. H. Waldschmidt, president of the North Dakota State Medical Society, was present, and outlined some of the problems of the society. Dr. Carroll Lund and Mr. Lyle Limond were guests at this meeting. Mrs. Snyder, of the North Dakota State Cancer Committee, outlined a few pertinent facts about the Cancer Caravan in North Dakota. Speakers for the evening were Dr. R. R. Tyson and Dr. J. B. Emich of Temple University, Philadelphia.

At the September meeting, Dr. Merrill Chesler, clinical instructor in surgery at the University of Minnesota, spoke on "Plastic Surgery." Dr. R. H. Waldschmidt was again present and addressed the society with particular reference to new legislation.

At the October meeting, Dr. Claude Hitchcock, associate professor of surgery at the University of Minnesota, gave a talk on "Emergency Management of Seriously Injured People."

At the November meeting, Miss Landon, auxiliary director of the Rehabilitation Unit in North Dakota, was introduced by Dr. Harwood and talked on the work of her unit in North Dakota. The society voted to contribute up to \$200 toward the essay contest of the American Association of Physicians and Surgeons. Motion was made and carried that a Heart Council be established in this area. Dr. Lancaster discussed the Forand bill.

The December meeting was devoted to a social gathering, and, as is our custom at this meeting, no scientific program was presented. The following officers were elected for 1958: president, Dr. L. G. Pray; vice-president, Dr. A. L. Klein; and secretary-treasurer, Dr. Frank M. Melton. Delegates to the state convention are: Drs. A. C. Burt, E. J. Beithon, F. M. Melton, W. L. Macaulay, F. A. DeCesare, and J. S. Gillam. Dr. E. M. Haugrud was elected censor.

V. G. BORLAND, M.D., Councillor

Second District

The Second District Medical Society held 9 regular scheduled meetings during 1957. The attendance at the meetings was excellent throughout the year.

New members accepted into the society during the year were: Dr. Stuart J. Cook, Rolette; Dr. William Gorrie, Maddock; Dr. Jerrold A. Munro, Rolla; and Dr. John Anthony, Leeds. Dr. Simpson, who had been admitted into the society, transferred to the Grand Forks District Medical Society. At the present time, all of the new men in the district are now members of the society.

Officers elected for 1958 are: president, Dr. G. H. Hilts, Cando; vice-president, Dr. W. A. Gorrie, Maddock; and secretary-treasurer, Dr. Louis F. Pine, Devils Lake. Delegates: Dr. William Fox, Rugby; and Dr. R. M. Fawcett, Devils Lake. Alternate delegates: Dr. D. W. Palmer, Cando; and Dr. J. H. Mahoney, Devils Lake. Censor: Dr. G. W. Seibel, New Rockford.

Scientific programs were held at each of the meetings, all of which were conducted by out-of-town speakers. On several occasions, lay speakers were brought in and it was felt throughout the society that some of these were very boring and uninteresting. It was felt that, in the future, we could probably dispense with some of these talks.

Programs included surgical aspects of thyroid disease by Drs. Jack Revere and Phil Berger of Grand Forks. Thromboembolism and thrombophlebitis were discussed by Dr. Keig of Grand Forks. In April, we were favored with the Cancer Caravan and the presence of Dr. Waldschmidt, president of the association at that time. Medical phases and surgical phases of cardiac surgery were discussed by Drs. Brandenburg and Bernatz of the Mayo Clinic.

The September 12 meeting was held at Cando. Dr. Dodds of Fargo discussed chest injuries. In November, Dr. Rodgers visited the society and presented the problems that we are facing at the present time. At the December meeting, Dr. Marvin of the University of Minnesota Hospitals spoke on radiation hazards.

During the year, several problems were brought up at the various meetings. Most notable was a lengthy discussion at the January meeting concerning the expansion of the Crippled Children's program. It was felt that the expansion was unwarranted and many phases of it were infringing upon the rights of the general practitioner. The secretary of the society was instructed to write a letter to Dr. Paul Johnson, stating the feeling of the society on this matter. At the request of Dr. Waldschmidt, a committee was appointed to head a local campaign for the purpose of publicizing the vaccination of people under 40 with Salk vaccine. At the September meeting, there was considerable discussion regarding the Welfare Board and physician relationship, the feeling being that members did not approve of the Welfare Board paying the patient directly and the patient, in turn, the physician. It was felt there was considerable inequity in this situation, the hospitals being paid by the Welfare Board but not the physician. However, as long as this is a federal ruling, it was felt that little could be done about it at the present time.

At the December meeting, quite a lengthy discussion was held regarding methods of combating prepaid industrial health plans. Free choice of physicians was considered an absolute essential.

The Devils Lake District Society contributed \$25 to the support of the essay contest. It was felt this was possibly a very good method of building up better public relations. However, in the past, response to this project has been disappointing.

G. W. TOOMEY, M.D., Councillor

Third District

The Grand Forks District Medical Society has a current membership of 70. The following officers were elected at our last annual meeting: president, Dr. John A. Sandmeyer, Grand Forks; vice-president, Dr. H. R. Piltingsrud, Park River; and secretary-treasurer, Dr. Wallace Nelson, Grand Forks.

The past year has been one of smooth fellowship without incidence to mar the steady progress of this society.

NELSON A. YOUNGS, M.D., Councillor

Fourth District

Nine meetings were held by the Fourth District during the past year.

On March 28, Dr. Kling of Bismarck gave a very in-

formative talk on problems as they apply to the pathologist.

On April 25, Dr. Waldschmidt, president of the State Medical Association, honored the society with a talk about the activities of the association. He urged that the delegates to the state meeting be called upon during the early fall to give the society members a report of the business that is transacted in the House of Delegates. He also spoke on and answered questions relative to the Medicare program.

May 17, Dr. E. Evans, from the University of Minnesota, spoke on "The Modern Concepts in the Treatment of Osseous Tuberculosis."

At the meeting on October 24, a full report was given by the several delegates attending the state meeting in Fargo. Also present at this meeting were Dr. Rodgers, state president, and Mr. Lyle Limond, executive secretary of the association. Both reviewed the problems and activities of the association.

November 14, Dr. Loken, from the University of Minnesota, read a paper on "Radiation Hazards."

December 16, Dr. Richardson, pathologist at St. Joseph's Hospital in Minot, showed a film on "Cytological Screening of Cancer."

January 17, Dr. Green of Rochester, Minnesota, gave a paper on "Asymptomatic Microhematuria."

February 27, Dr. James Masson, from the Mayo Clinic, spoke on "Surgery of the Head and Neck." Dr. O. A. Sedlak and Mr. Don Eagles of Fargo were present and reviewed the Blue Shield program.

Officers elected at the January meeting are: president, Dr. W. B. Huntley; vice-president, Dr. Samuel Shea; and secretary-treasurer, Dr. R. A. Vaaler.

During the year, 8 new members were accepted. Four members transferred elsewhere. Total membership is 67; 63 are active members and 4 are retired or honorary members.

D. J. HALLIDAY, M.D., Councillor

Fifth District

The Sheyenne Valley Medical Society held 7 meetings during 1957. Membership now numbers 7 with the addition of Dr. T. A. Harris of Cooperstown as a new member. Officers elected to serve for the year of 1958 are: president, Dr. G. Christianson; vice-president, Dr. J. P. Merrett; and secretary-treasurer, Dr. C. J. Klein. Delegate: Dr. N. A. Macdonald. Alternate delegate: Dr. C. J. Klein.

Due to the untimely death of Dr. W. H. Gilsdorf, Dr. G. Christianson was elected to serve out Dr. Gilsdorf's term as councillor for the Fifth District.

Scientific meetings consisted of several Upjohn Company Grand Rounds films. The topics were: "Borderline Cases of Carcinoma," "Carcinoma of the Breast and Colon," and "Therapeutic Advances in Liver Disease."

Dr. F. L. Behling, of Fargo, spoke on "Treatment of Vascular Occlusion of the Lower Extremity." Miss Frances Landon, of the University of North Dakota, spoke in regard to rehabilitation facilities available at the new Rehabilitation Center at the University.

The society was saddened by the death of Dr. W. H. Gilsdorf on Friday, September 20, 1957, after a very short illness.

The North Dakota chapter of A.A.G.P. held its meeting in Valley City in December 1957.

G. CHRISTIANSON, M.D., Councillor

Sixth District

This society held 4 meetings during 1957, with an average attendance of 45 members. The total member-

ship at the end of the year 1957 was 65. The officers for 1957 were: president, Dr. Phillip Blumenthal, Mandan; vice-president, Dr. Herman J. Bertheau, Linton; and secretary-treasurer, Dr. Robert D. Schoregge, Bismarck. Members of the House of Delegates from this district were: Dr. R. B. Tudor, Bismarck; Dr. Carl J. Baumgartner, Bismarck; Dr. M. E. Nugent, Bismarck; Dr. M. S. Jacobson, Elgin; and Dr. R. W. Henderson, Bismarck. The Board of Censors were: Dr. G. R. Lipp, Dr. Percy Owens, and Dr. E. D. Perrin, all of Bismarck.

The guest at our first meeting was Dr. Robert Brandenburg, of the Department of Cardiology, Rochester, Minnesota, who spoke on "Newer Techniques in Cardiac Investigation and Diagnoses."

The next regular meeting of the society was held May 2, 1957, under auspices of the North Dakota Cancer Society. The main speakers of the evening were Mrs. Mary Snyder, executive director of the North Dakota Cancer Society; and Dr. R. R. Tyson and Dr. J. B. Emich, of Temple University, Philadelphia. Dr. R. H. Waldschmidt, President of the North Dakota State Medical Society, also gave a resumé of the association's problems at this time. The topic for the evening was "A Symposium for Surgery in the Elderly Patient."

The third regular meeting of the society was held on October 25, 1957. The guest speaker of the evening was Dr. Ulf Rudhe, of the Karoline Institute of Stockholm, Sweden. He spoke on "Radiological Abnormalities of the Urinary Tract in Children." At this meeting, it was also moved and carried unanimously that the delegates from this district give a report of the state meeting at the first meeting of the district society after the annual meeting of the state association.

The last regular meeting of this society was held on December 4, 1957. The guest speakers for the evening included Mr. Edward L. Sypniewski, executive director of the North Dakota Tuberculosis and Health Association and Dr. James F. Marvin, assistant professor of radiology at the University of Minnesota, who spoke on "Radiation Hazards."

Members who joined the Sixth District Medical Society in 1957 are: Dr. H. P. Smeenk, Bismarck; Dr. A. F. Samuelson, Bismarck; Dr. Harvey S. Brodovsky, Bismarck; and Dr. W. J. McGee, Riverdale (transfer).

C. H. PETERS, M.D., Councillor

Seventh District

Six meetings of the Seventh District Medical Society were held from May 1, 1957, through March 21, 1958.

May 1, 1957—The annual Cancer Caravan visited Jamestown. Dr. John B. Emich spoke upon the subject of "Cancer in the Female," and Dr. Robert R. Tyson spoke on "Cancer Surgery in the Elderly Patient." Both men are members of the staff of Temple University, Philadelphia. Dr. R. H. Waldschmidt, president of the North Dakota State Medical Association; Mr. Lyle Limond, executive secretary; Dr. Carroll Lund, coordinator of the Caravan; and Dr. Walter Gilsdorf and Dr. Clifford Klein of Valley City were guests.

September 26, 1957—The first meeting of the fall was held at the Moline Cafe. Dr. Robert MacDonald, of Gackle, was voted active membership in the society. Dr. T. E. Pederson, alternate delegate to the A.M.A., reported on the House of Delegates proceedings at the A.M.A. Convention in New York in June. He also reported on the House of Delegates meeting at the state meeting in May. Dr. Nierling added a few remarks concerning the council's activities as well as some remarks on the scientific sessions of the A.M.A. A Grand Rounds film, No. 4, "Pre-Malignant and Malignant Le-

sions of the Breast and Colon," sponsored by the Upjohn Company, concluded the meeting.

December 2, 1957.—This meeting was held at the Jamestown Hospital. Six local dentists were guests at the meeting. The Woman's Auxiliary is sponsoring the annual essay contest. A Poison Control Center is being set up in Jamestown and this was described by Dr. Miles. The main program was sponsored by the North Dakota Tuberculosis and Health Association. Dr. James V. Marvin, associate professor of radiology at the University of Minnesota, spoke on "Radiation Hazards in Medical Practice."

January 23, 1958.—The following officers were elected for the year: president, Russell O. Saxvik; vice-president, Ellis Oster; and secretary-treasurer, R. D. Nierling. Delegates: T. E. Pederson and John Van der Linde. Alternate delegates: Russell O. Saxvik and J. N. Elsworth. Censors: three years, Edwin O. Hieb; two years, John Van der Linde; and one year, Ellis Oster.

Guests for the evening were Mr. Lyle Limond, executive secretary; Dr. M. Sakai, pathologist; and Miss Frances Landon, executive director of the University Rehabilitation Unit in Grand Forks. The society voted to give the Science Fair \$75. Miss Landon spoke on the needs of habilitation and rehabilitation, describing the services available to the patients at the Center at Grand Forks and also mentioning the further needs of the Center, mainly dormitory and children's facilities. Films on "Bedside Diagnoses of Fluid Balance Problems" and Grand Rounds film No. 5, "Diagnostic and Therapeutic Advances in Liver Disease" concluded the program.

February 28, 1958.—The meeting was held at the Jamestown Hospital. Guests for the evening were Dr. R. W. Rodgers, state president; Mr. Lyle Limond, executive secretary; and Dr. George Loeb, superintendent of the State Tuberculosis Sanatorium. Dr. Rodgers discussed the Medicare program, Blue Shield problems, the Forand bill coming up before Congress, the United Mine Workers contract, and the American Medical Education Foundation. Dr. Loeb spoke on the disposition of the State Sanatorium in San Haven and then followed with a discussion of the incidence, diagnosis, and treatment of pulmonary tuberculosis. In 1953, there were 214 new cases, and this number has decreased yearly since. In 1957, there were 112 cases, and most of these were not far advanced. He felt that the mobile x-ray units have outlived their usefulness and that x-rays of susceptible groups and contacts should be done. Skin testing should be universal. Drugs and surgery have replaced phrenic nerve crushing, pneumothorax, and pneumoperitoneum. Following the meeting, Dr. Loeb showed many x-rays.

March 21, 1958.—The Annual Cancer Caravan was held at Jamestown Hospital. Nine local dentists were guests of the society for the evening and also Dr. R. W. Rodgers, state president; Dr. Carrol Lund, coordinator of the Caravan; Mr. Lyle Limond, executive secretary, as well as the speakers for the evening, Drs. William H. ReMine and James K. Masson of the Mayo Clinic. Following the dinner, Dr. Saxvik opened the meeting by welcoming the dentists. Dr. B. V. Nierling, president of the local dental society, responded. Dr. R. W. Rodgers introduced the guest speakers. Dr. James K. Masson spoke first on the subject of "Benign and Malignant Lesions in the Oral Cavity." Dr. William H. ReMine followed with an address on "Lesions of the Neck and Cervical Region." Many colored slides were shown of the various lesions of the oral cavity and neck, and some of the slides depicted the surgical procedures done for the purpose of removing these lesions. Dr. Masson is in

the Plastic Surgery Division of the Mayo Clinic and Dr. ReMine in general surgery at the clinic. A question and answer period followed. A brief business meeting followed with Dr. Nierling announcing Medical Education Week—April 20 to 27. A Grand Rounds film on "Cardiac Stress" is to be shown at the Jamestown Hospital March 26, and the annual Science Fair is to be held March 28 and 29 at the High School.

A meeting of the society will be held the latter part of April, at which time Dr. Lee A. Christoferson, of Fargo, will address the group on "Head Injuries and Their Management."

There are 30 members of the society at the present time—1 new member having been added during the year and 2 lost as the result of moving from the district.

R. D. NIERLING, M.D., Councillor

Eighth District

The Eighth District Medical Society is comprised of physicians practicing in Watford City, Tioga, Crosby, and Williston, currently numbering 19 members.

On April 23, 1957, the quarterly meeting of the society was held at the El Rancho dining room. Two eminent speakers, Dr. Wilcox and Dr. Selp of Columbia University, presented papers on the "Elderly Cancer Patient."

November 15, 1957, the society convened at the Elks' Home for a dinner meeting and scientific program. M. R. Loken, Ph.D., was the guest speaker and spoke on "Radiation Hazards in Medical Practice." Dr. Loken is assistant professor of radiology at the University of Minnesota. He presented research data as well as useful, practical information. The meeting and dinner was enjoyed by all.

On January 22, 1958, the society's annual business meeting was held at the Williston Clinic. The following officers were elected for the ensuing year: president, Dr. Joc Craven; vice-president, Dr. Duane Pile; and secretary-treasurer, Dr. Andrew Sathe. Delegate: Dr. Alan Johnson. Alternate: Dr. Dean Strinden.

At this meeting, Don Eagles, of Blue Cross, and Dr. O. A. Sedlak, medical director of Blue Cross, were guest speakers and explained the program and Blue Cross plans for 1958 and the future. This was followed by a question and answer period.

JOSEPH D. CRAVEN, M.D., Councillor

Ninth District

The Southwestern District Medical Society held 8 official meetings in 1957. We have 29 members, 3 of whom are retired.

The first meeting was held February 9, 1957, at the Dickinson Elks' Club where dinner was served to members and their wives. The doctors then went to St. Joseph's Hospital where the Grand Rounds movie was shown.

The second meeting was held April 13, 1957. The polio campaign was discussed. A uniform polio vaccination charge was discussed, and \$10 for the 3 injections was suggested. We were also addressed by Mr. Don Eagles, of the North Dakota Blue Shield. Dr. Charles Arneson, of Bismarck, discussed "Medicine and the State Legislation."

The third meeting was held May 3, 1957, and included a Cancer Caravan evening. The state president, Dr. Waldschmidt, was present and spoke on state medical society activities. Some medical administrator problems were discussed by Mr. Lyle Limond, our executive secretary. Dr. C. M. Lund introduced Dr. R. Robert Tysan, Temple University, and Dr. John P. Emich, also

of Temple, who lectured on "Surgery and the Elderly Cancer Patient." Mrs. Mary Snyder, executive director of the North Dakota Division of the American Cancer Society also spoke to us.

The fourth meeting was held June 8, 1957. Since this meeting was the first following the annual state meeting, which was held May 25 and 26 at Fargo, several officer reports were made. Dr. Keith Foster gave a report on action taken by the House of Delegates. Dr. A. R. Gilsdorf reported on the meetings of the council. Our new state president, Dr. R. W. Rodgers, gave a detailed discussion on the problems facing the state medical society for the coming year. He also spoke on the problems facing the local society. After this meeting, a film on "Anticoagulants" was shown.

The fifth meeting was held August 10, 1957. "Asiatic Flu" was discussed. A letter was received from the State Tuberculosis Association regarding their activities. Our secretary was instructed to write to them stating our desire to participate in their program. Another Grand Rounds film was shown.

The sixth meeting was held October 12, 1957. This meeting was dedicated essentially to discussions on medical emergencies. Dr. Gladys E. Martin discussed medical emergencies in children. Dr. Keith Foster discussed this subject from the internist's aspect. Dr. D. J. Reichert discussed medical emergencies in relation to eye injuries.

The seventh meeting was held November 9, 1957. Correspondence received from Miss Frances D. Landon, executive secretary of the Medical Rehabilitation Unit of North Dakota, was discussed. Correspondence was also received from the American Psychiatric Association requesting suggestions from the general practitioners for postgraduate courses in psychiatry. A scientific paper was delivered by Merle Loken, Ph.D., assistant professor of radiology at the University of Minnesota, on "Hazards of Radiation."

The final meeting was held December 14, 1957. A letter from Mrs. L. T. Longmire, of Devils Lake, was read requesting prize money for an essay contest sponsored by the Association of American Physicians and Surgeons. Seventy-five dollars was allotted from our local treasury.

The following officers were elected: president, Dr. Robert E. Hankins, Mott; vice-president, Dr. R. F. Raasch, Dickinson; and secretary-treasurer, Dr. D. J. Reichert, Dickinson. Delegates: Dr. Keith Foster, Dickinson; and Dr. R. F. Gilliland, Dickinson. Alternate delegates: Dr. W. C. Hanewald, Richardton; and Dr. Julian Tosky, Hebron. Councillors: Dr. W. M. Buckingham, Elgin; Dr. R. J. Dukart, Dickinson; and Dr. A. J. Gumper, Dickinson.

Members appointed to the North Dakota Physicians Service Corporation were: Dr. Keith Foster, Dickinson; Dr. R. F. Gilliland, Dickinson; Dr. A. R. Gilsdorf, Dickinson; and Dr. R. W. Rodgers, Dickinson.

Appointed to the North Dakota Physician Service Board of Directors was Dr. R. W. Rodgers, Dickinson.

During the year 1957, 2 of our members transferred—Dr. Robert Goulding, of Bowman, to California; and Dr. James Moses, of Richardton, to California. Two members came into our society—Dr. Knickerbocker moved to Hettinger, and Dr. Robert Thom moved to Bowman.

A. R. GILSDORF, M.D., Councillor

Tenth District

The Tenth District Medical Society held 4 official meetings in 1957. Three of the meetings were held in

Mayville, while a spring meeting was held at Dr. and Mrs. McLean's home in Hillsboro.

Each was a dinner meeting followed by a scientific meeting and then coffee at one of the doctors' homes.

The first meeting was held in Mayville on April 10, 1957, at which time Mr. Don Eagles talked on the operations of Blue Shield.

The second meeting was held in Hillsboro on May 8, 1957. We were guests of Drs. McLean and Mergens. As the scientific portion of our program, we were shown the latest Grand Rounds film.

Our next meeting was held in Mayville on October 2, 1957, and, again, we used the Grand Rounds film for our scientific session.

Our last meeting of the year was held October 30, 1957, in Mayville. For the scientific session we used another Grand Rounds film. Following is a list of the officers elected for 1958: president, Dr. R. C. Little; vice-president, Dr. K. G. Vandergon; and secretary-treasurer, Dr. R. W. McLean. Delegate: Dr. R. W. McLean. Alternate delegate: Dr. Mervin Rosenberg.

Corporate members of Blue Shield: Dr. K. G. Vandergon and Dr. R. W. McLean. Censors: three years, Dr. R. C. Little; two years, Dr. D. N. Mergens; and one year, Dr. H. A. LaFleur.

There have been no changes in membership in the year of 1957. We continue to have 8 active members, 1 retired member, and 1 member in the Air Force.

K. G. VANDERGON, M.D.

COMMITTEE REPORTS

Committee on Mental Health

The chairman of the Committee on Mental Health failed to call a meeting this year. This is indeed unfortunate as a number of trends and current events should have the consideration and recommendation of the Committee on Mental Health and the State Medical Association itself.

These trends and events include the mushrooming use of tranquilizing medications, the development of at least 2 county mental health associations, the efforts of public welfare agencies to provide greater amounts of services to families and children with mental or emotional problems, the increasing awareness of the needs and lack of facilities for care and treatment of emotionally disturbed children, and increasing programs directed toward mental health education both in formal educational systems and for adult education.

In order for the Committee on Mental Health to carry out its duties and functions, I should like to suggest appointment of a new energetic chairman, and, second, because of the scattered geographic location of the members of the committee, that permission be given to hold an "Eastern" and a "Western" meeting or meetings with less than a quorum. The reason for this is that no matter where a meeting might be held, some members of the committee would be at least 200 miles away from the meeting place.

JOHN G. FREEMAN, M.D., Chairman

Committee on School Health

There was no official meeting of the School Health Committee during this past year. However, as a follow-up on the Mental Health Education report of the year before and the approval of the House of Delegates, the chairman of the School Health Committee met with and accepted a membership on the Board of Directors of the North Dakota Association for the Mentally Retarded.

Your chairman plans to work with this association to

accomplish what can be done for the educable children under our school health recommendations.

R. W. McLEAN, M.D., Chairman

Committee on Diabetes

The Committee on Diabetes, whose primary function is to encourage and coordinate annual diabetes detection drives throughout the state under sponsorship of constituent local medical societies, has very little to report for the year 1957-1958.

Unfortunately, no detection drives were held by any of the district medical societies throughout the state except in Grand Forks where a modest drive was held in November, 1957. This drive consisted of distributing Clinistix mounted on a card with space for appropriate data to be recorded by the person testing himself. Despite the fact that over 5,000 test envelopes were distributed primarily throughout the churches in Grand Forks, only 461 tests were returned, indicating considerable apathy on the part of the public in performing this extremely simple test. Of the 461 tests, there were 93 individuals who reported a family history of diabetes, 344 negative tests without positive family history of diabetes, and 24 positive tests were found in the entire testing program. Of these 24 tests, follow-up data has not yet been completed, but preliminary estimates indicate that at least 1 new case of diabetes was discovered.

The results of the drive in Grand Forks indicate that regardless of how simple and convenient one makes the self-testing device, public response apparently depends primarily upon the amount of publicity and inducement offered to take advantage of the test. In direct contrast to this meager response is the fact that some 7,000 urine specimens were returned when 9,000 containers were distributed in Grand Forks by the Jaycees from house to house several years ago. Despite the inconvenience of this method, it yielded the most rewarding results to date, and many new cases of diabetes were discovered as a result.

In summary, it would seem that the public health aspect of the magnitude of the diabetes problem should be stressed with wide publicity via the press, radio, and through local organizations if adequate results are to be obtained from detection drives. There was little or no publicity given to the 1957 Grand Forks drive, and the results depended entirely upon the individual's interest in reading directions on the envelope and in mailing the results of his test to his personal physician or the Grand Forks District Medical Society. While Clinistix is an excellent and highly convenient testing device, it will not be the answer to successful diabetes detection drives unless an effective publicity program is properly executed.

E. A. HAUNZ, M.D., Chairman

Committee on Foreign Trained Physicians

The number of foreign trained physicians seeking licensure in the United States began to increase about 1936, and, by 1940, over 3 times as many were examined as in 1936. Beginning in 1944, the number decreased until 1951, when there was a noticeable increase, and in each succeeding year since there has been a substantial increase. In the period 1946-1956, 8,828 graduates of foreign medical schools were licensed in the United States and over half of these were licensed in 3 states—New York, Illinois, and Ohio. The failure rate in these 3 states was high; namely, 59 per cent, 70 per cent, and 29 per cent. Grand ten-year failure rate in all states was 47 per cent as compared with a failure rate of around 3½ per cent for United States and

Canadian graduates. It is difficult to state how many foreign graduates in the United States are not licensed, but it surely must be somewhere in the 7,000 to 10,000 figure.

There are over 500 medical schools in countries outside the United States and Canada. In 1950, the A.M.A. listed some 50 of these schools as appearing to have the same curriculum as United States schools, and graduates of these schools were recommended for favorable consideration by United States examining boards. The balance of the foreign schools were neither approved or disapproved. Since there is no possible way to survey and appraise these schools, the Council of Medical Education of the A.M.A. has decided to discontinue such listings after 1959. Such a decision is surely a wise one as the list was of no possible value and only caused confusion to both the examining boards and foreign physicians. In general, foreign graduates are not eligible for licensure in 10 states; 21 states accept only graduates of the list previously published by the A.M.A., a few states have developed their own list of acceptable schools; 28 states require one year of internship in the United States; 21 states require full citizenship; and 15 Boards require declaration of intent.

After four years of study and preparation, the Educational Council for foreign medical graduates has been established under the sponsorship of the Federation of State Boards, the Medical Council of the A.M.A., the Association of American Medical Colleges, and the American Hospital Association. This organization will study and interpret credentials and conduct examinations in the United States several times a year to determine if the applicant possesses the same quantity and quality of medical education and knowledge as the American graduate. Several states, and North Dakota is one, will accept a certificate from this council as evidence of sufficient medical knowledge to admit him to the state board examinations. It is hoped that more states will make use of this certifying agency.

In 1948, Congress passed the United States Exchange Act, the purpose of which was to promote international exchange of knowledge and skills and to promote international good will and understanding with nations who were friendly with the United States. This act was revised in 1952 and again in 1957.

It has been most difficult for your committee to obtain figures indicating the extent of this exchange program from the Department of State, under which it operates. In 1956, 18,995 professional, technical, and kindred workers were admitted to the United States, but any breakdown of this figure to show how many were physicians could not be obtained.

In the same year, 3,452 of this group departed from the United States. Approximately the same ratio exists for the past five years, so probably about 80 per cent of this group remains in the United States. The following figures have recently been obtained from the Institute of International Education and are assumed to be approximately correct:

In 1954 and 1955, foreign physicians on exchange program numbered 4,813, of whom 1,709 were interns and 3,104 were residents.

In 1955 and 1956, foreign physicians on exchange program numbered 6,167, of whom 2,343 were interns and 3,824 were residents.

In 1956 and 1957, foreign physicians on exchange program numbered 6,741, of whom 1,988 were interns and 4,753 were residents.

No information could be obtained as to how many returned to their native land.

There are about 7,000 graduates from our 84 United States medical schools each year. The average number of medical students in each class in the United States and Canadian medical schools is under 100. Three United States schools have over 100 students in each class; enrollment in each class in foreign medical schools reached into the hundreds and, in some cases, 1,000 to 2,000. One can easily see from such figures that any personal contact between faculty and students is impossible. There are over 12,000 approved internships and 25,000 approved residencies among about 1,000 hospitals sponsoring such. These figures show that not enough physicians graduate in the United States each year to fill these internships and residencies. Naturally, one must ask, "Are we graduating too few doctors in the United States or have we too many approved internships and residencies?" This question is frequently discussed in deliberations of these organizations, which are interested in the problem. Last year there were 6,741 interns and residents on the staff of 794 hospitals in 44 states who were graduates of foreign medical schools. Many of these physicians are not licensed in any state.

There are about 500 foreign students enrolled in United States medical colleges and about 12,000 United States citizens enrolled in foreign medical schools, most of whom are in Switzerland and Italy. There must be some special reason for this, as last year vacancies were available in most United States medical schools for well-qualified students seeking admission.

The foreign physicians in the United States for medical training on student visas are morally bound to return to their native land after three years of study in order that by means of this training, the standards of medical care can be improved in those countries. How many actually return appears to be restricted information; at least all such inquiries directed by your chairman to the State Department have been ignored. It would seem that after one year of residence in the United States, foreign students are not anxious to go home; after two years, they are very reluctant; and after three or more years, they are determined not to return and will utilize every possible means to prolong their stay here. While Congress stated on June 4, 1956, that an exchange visa cannot be changed into an immigrant visa until at least two years after departure from the United States, there are numerous ways to evade this restriction. At present, many of these doctors complete a three-year residency in some specialty, and, if unable to remain in the United States on an immigrant visa, they simply change to some other specialty in order to continue to reside in the United States for further training.

If international understanding is to be served and world medical standards are to be raised, it is desirable and essential that the American trained foreign physician return to his own country and put his training into use. It is well to keep in mind that when we remove qualified physicians from countries which already lack sufficient physicians, such as India, Turkey, Greece, and the Middle East and Africa, we defeat the very purpose of the Congressional Act. In President Eisenhower's message to the Senate on July 1, 1955, he stated: "All the exchange programs are founded in good faith. We can maintain them as effective instruments for promoting international understanding and good will only if we insist the participants honor their commitments to observe the conditions of the exchange. Exchange aliens must return to the country from which they came to the United States, and the United States must not permit

either immediate re-entry or other evasion of the return rule."

No examining board has the wish to interfere with any provisions of the Immigration Act. However, we are obligated to insist that physicians coming to this country be fully evaluated on the basis of our medical standards before being granted the right to practice medicine.

It is the official duty of all state examining boards to accept the qualified physicians and to reject those who are not qualified, so that the American people will continue to receive the high type of medical service they are entitled to.

Foreign physicians in North Dakota. In the period 1950 and 1952, 15 displaced foreign physicians were each given a temporary license in North Dakota after serving at least one year as an intern in a North Dakota Hospital and writing the state board examinations. Two social agencies placed these physicians where it appeared medical attention was insufficient, and, in some cases, they were given financial assistance by these communities. Of these men, 8 still remain in their original location, 5 have left the state, and 2 have moved to other communities in North Dakota. Thirteen of these men have obtained permanent licenses.

During the 1949 to 1958 period, 17 foreign physicians were licensed in North Dakota, and 12 foreign physicians failed the state board examinations. Of the 17 licensed, 5 have left the state.

As secretary of the North Dakota State Board of Medical Examiners, your chairman receives hundreds of letters yearly (several in each day's mail) requesting information as to how to obtain a license in North Dakota. Most of these requests come from foreign physicians who are not licensed in any state and who are either in internships or residencies or are salaried physicians in some state mental or tuberculosis hospital.

Many are from substandard schools and have been refused entrance to many state board examinations or have failed before various boards. It is hoped that examining boards in the United States will consider certification by the Educational Council as comparable to graduates from approved medical schools in the United States and Canada. The purpose of the Educational Council is not to exclude the foreign graduate, but it will surely fail in its purpose if it does not exclude the foreign graduate who does not meet our high standards of medical education.

"MEDICAL STATUTES—Chapter 43-17—Physicians and Surgeons, 43-1722. *License; Fees.* An applicant for a license to practice medicine, found by the board to be qualified for licensure, shall be granted a license to practice medicine in this state; provided, however, that, if the applicant is not at the time a citizen of the United States, he shall be granted only a temporary license, valid for not to exceed six years, such license to be converted by the board into a permanent license only upon his acquiring full United States citizenship before the expiration of such period and only if, during the entire period from the issuance of such license to the acquisition of citizenship, he shall have practiced the profession of medicine continuously within this state, otherwise to terminate upon the expiration date of such temporary license. The license shall be signed by the president, the secretary-treasurer, and members of the board, and shall have the seal of the board affixed thereto or impressed thereon. The fee for the examination shall be determined by regulation of the board.

Source: R. C. 1943; am'd. S.L. 1957, c. 302, s. 10."

C. J. GLASPEL, M.D., Chairman

Committee on Emergency Medical Service

Progress has been made in setting up a civil defense plan in North Dakota. A preliminary operational survival plan is in print as of November, 1957.

The State Health and Medical Care Service will have the following organization and duties:

A. *Chief of Health and Medical Care* (director of Public Health, State Health Department) will:

1. Coordinate and direct operations of all divisions of Health and Medical Care Service.
2. Coordinate planning and operations of the service with those of other civil defense agencies.
3. Coordinate planning and operations of the service with the American Red Cross and other private or public agencies having civil defense health responsibilities.
4. Choose his deputy and subordinates in the scheme of the service's organization and make provision for a line of succession in the organization.

B. *Deputy chief of Health and Medical Care* (director, Division of Preventable Diseases, State Health Department) will assist the chief of the health and medical care service in the discharge of his responsibilities and act as chief in the absence or incapacity of the chief.

C. *Chief of the Medical Care Division* (director, Division of Maternal and Child Health, State Health Department) will coordinate all medical care activities and all medical care facilities and their equipment.

D. *Deputy chief for Hospital Facilities* (director, Division of Hospitals, State Health Department), will coordinate the establishment and operation of all hospital facilities.

E. *Deputy chief for Medical Personnel* (executive secretary, North Dakota Medical Association) will coordinate the selection and allocation of medical personnel.

F. *Deputy chief for Paramedical Personnel* (director, Division of Nursing, State Health Department) will coordinate the selection and allocation of all paramedical and lay personnel assigned health and care duties.

G. *Deputy chief for Inpatient Care* (president, North Dakota State Medical Association) will coordinate the policies for treatment of all patients requiring hospitalization.

H. *Deputy chief for Outpatient Care* (president-elect, North Dakota State Medical Association) will coordinate operations and policies for treatment of all outpatient cases.

I. *Chief of the Blood Program* (director of State Blood Bank) will coordinate and direct the procurement, collection, processing, storage and maintenance of inventories, and the distribution of blood and blood substitutes.

J. *Chief of the Biological and Chemical Warfare Division* (chief of Laboratory Services, State Health Department) will coordinate and direct all operations pertaining to detection, protection, and treatment of chemical and biological warfare agents and their effects.

K. *Deputy chief for Biological and Chemical Warfare—Human Branch* (director of Grand Forks Public Health Laboratories) will coordinate and direct all operations regarding defense against chemical and biological agents affecting humans.

L. *Deputy chief for Biological and Chemical Warfare—Food Plants and Animals Branch* (director of Bismarck Public Health Laboratory, State Health Department) will coordinate and direct all operations regarding defense against chemical and biological agents affecting food plants and animals.

M. *Chief of Public Health* (director, Division of Gen-

eral Sanitation, State Health Department) will coordinate and direct all operations pertaining to the protection of the environment and the health of the public.

N. *Deputy Chief of the Water Supply Section* (director, Division of Water Supply and Pollution Control, State Health Department) will coordinate and direct all operations for insuring the purity for human consumption of water sources and supplies.

O. *Deputy Chief of Food and Milk Section* (chief, Sanitation, Bismarck City Health Department) will coordinate and direct all operations for insuring the purity for human consumption of food and milk.

P. *Deputy Chief of Sewage and Waste Disposal Section* (assistant director, Division of Water Supply and Pollution Control) will coordinate and direct the disposal of waste and sewage.

Q. *Deputy Chief of Insect and Rodent Control Section* (director, Division General Sanitation) will coordinate and direct all operations to minimize the effects of insects and rodents on humans, plants, and animals.

R. *Deputy Chief of Radiological Warfare Effects Control* (director, Division of Institutional Sanitation-SHD) will coordinate and direct, in liaison with the Radiological Defense Service, operations to counteract the effects of radioactivity on humans, plants, and animals.

S. *Mortuary section* (president, State Board Embalmers) will coordinate and direct the planning and operations to include: (a) the proper and efficient disposal of human remains and (b) the maintenance of complete legal records concerning such disposal, including the disposition of personal property of deceased persons.

T. Service staff

1. *Supply officer* (director, Division of Dental Health, State Health Department) will maintain inventories of medical supplies and coordinate and transmit to the Supply Service, via CD command channels, requests for additional medical supplies.

2. *Transportation officer* (director, Division Administration State Health Department) will maintain records of transportation sources available to the Health and Medical Care Service and coordinate and transmit to the Transportation Service, via CD command channels, requests for additional transportation facilities.

3. *Communications officer* (Communicable Disease Investigators, SHD) will direct the operation of communication media assigned to the Health and Medical Care Service and coordinate and transmit to the Communications Service, via CD command channels, requests for use of additional or substitute media.

4. *Liaison staff officers* will, as determined necessary, coordinate the operations of the service with those of other CD agencies, other government agencies, and special public, quasi-public, and private agencies, such as the Red Cross and the Salvation Army.

R. F. NUESSELE, M.D., Chairman

Committee on American Medical Education Foundation

North Dakota dropped about \$500 in the 1957 contributions to A.M.E.F. as compared with 1956, yet the same number contributed, and, in scanning the names of the contributors, it is about the same group that contributes each year. I am sure each and every one is desirous of carrying his own share, and I am inclined to feel that the fault lies in lack of district organization. Our intentions may be good but unless someone in each organization makes personal contacts, the donation is not made.

In the American way, each state has adopted a different attack to the problem. Illinois was the first to declare that this should be the responsibility of every member of the society and, therefore, passed a dues increase of \$20 a year per member allocated to the A.M.E.F. In 1955, California, Idaho, Nevada, and Arizona also raised their dues for the same purpose. These generous contributions from the societies themselves are matched in many states by purely voluntary appeals done in an organized way at the local level. By this method, Minnesota last year donated \$36,846. In Pennsylvania, the House of Delegates voted in favor of a \$25 voluntary contribution by each member—such a contribution to A.M.E.F., unearmarked, resulted in a matching gift from the Ford Foundation. Probably needed stimulus might be provided if our House of Delegates would place their stamp of approval on each member of our state society making such a voluntary gift.

W. E. G. LANCASTER, M.D., Chairman

Committee on Cancer

Your chairman attended 7 cancer meetings during the past year, 3 national and 4 state. The annual session of the American Cancer Society was held in New York, November 1, 1957. At the scientific session, papers on "Cancer of the Head and Neck" were thoroughly discussed by eminent surgeons. The first impression left one feeling that the surgery was extremely radical, but after witnessing five- and ten-year survivals and permanent cures without much disfigurement, such type of surgery seemed definitely justified. Dr. Hayes Martin, chief of the Head and Neck Service at Memorial Hospital, New York, gave an amazing report on approximately 1,100 cases of cancer of the head and neck. It was surprising to note that many of the single lesions of the tongue without nodal involvement only received excision of the primary tongue lesion, whereas other surgeons definitely argue for a neck dissection. The business session at this meeting was concerned primarily with the national policy on fund raising. The independent fund raising and educational crusade has been an essential part and a major factor in the immense growth of cancer research and an increase in the number of lives saved from cancer each year. A resolution was adopted at this meeting to have all states withdraw from the United Fund Raising Campaigns after 1960. This probably will be unpopular with the public at first, but when they realize that our research program must continue if we are to find the cure for cancer, and the only way to continue this policy is to continue our independent fund raising method, they will accept this policy.

Your chairman is a member of the National Scientific Committee and also a member of the National Public Information Committee. A meeting of both committees was held in New York, January 16, 1958. A variety of policies were presented and adopted for lay education and also scientific education. I had the pleasure of viewing at this meeting some movies of an interview the American Cancer Society conducted with Dr. Hocksey of Texas. I am hoping to bring these 2 reels of movies to North Dakota to exhibit at the various medical societies in the future. They are very interesting and amusing. After having seen these movies, our North Dakota doctors will be better acquainted with the problems we have in combating the work of quacks.

A division meeting of the northwestern states of the American Cancer Society was held in Butte, Montana, September 10, 1957, at which time your chairman was accompanied by Dr. Rodgers, of Dickinson, and Dr. O.

W. Johnson, of Rugby. At this meeting, a thorough discussion of cytology, in addition to other business matters, was brought to the attention of the participants. We are again confronted with the problem of developing cytotechnologists. Pathologists appear overburdened with cytologic examinations and, until this bottleneck is corrected, the problem remains immense.

You will recall that last year we stated that a program had been decided upon to establish cancer registries in all North Dakota hospitals. An inquiry was sent to all staff members and the chairmen of the staffs to indicate whether they would approve or disapprove of the establishment of such a registry. We are very happy to report that of all the hospitals in North Dakota, only 2 rejected our proposal. There already were 4 very fine cancer registries established in North Dakota, and to date we have established 14 new additional cancer registries in North Dakota. There are approximately 70 hospitals in North Dakota, and, at this rate, we hope to complete our program within four more years. The North Dakota Medical Librarians will have their annual meeting at Fargo, April 22, 1958. At this time, we will have a speaker from the American Cancer Society office of New York, Dr. Aubrey Schneider, who will give a thorough discussion of the cancer registry, its purpose, and how to establish it. We also hope to have the chief of staff from each hospital keep a watchful eye on these registries and push them along from time to time. We are informed that in the not too distant future a cancer registry will be a requirement for hospital accreditation.

In spite of the late cancellation of a prominent dental pathologist, we were able to present 3 outstanding speakers for the 1958 Cancer Caravan. The subject of "Cancer of the Head and Neck" was chosen as the theme for 1958. This theme served as a double purpose. In the past, we felt that we had badly neglected our dental friends in our cancer work. Your chairman appeared at the state dental meeting in Fargo, in June 1957, at which time he offered to invite the dentists to cooperate in our cancer program. The dental society appointed Dr. Russell Sands, of Fargo, and Dr. V. A. Corbett, of Minot, as their representatives to our scientific committee. Following this appointment, it was decided to procure a medical and dental team to present our 1958 Caravan. These meetings began in Williston, March 18, 1958, at which time Dr. R. E. ReMine, surgeon, and Dr. James Masson, a plastic surgeon of the Mayo Clinic, were our principal speakers. A very good program and lecture with slides on "Cancer of the Head and Neck" were presented. This group also presented similar lectures in Dickinson, Jamestown, and Bismarck. The dental profession was well represented at these meetings. The second section of our program began in Fargo on March 25, 1958, at which time Dr. Stuart Arhelger, associate professor of surgery at the University of Minnesota and director of its Tumor Clinic, presented a paper on "Cancer of the Oral Cavity." It was on this program that the additional paper on "Soft Tissue Lesions of the Oral Cavity," which was cancelled, was to have been presented, but Dr. Arhelger very ably upheld the high standards of cancer lectures. This program was also presented at Grand Forks, Devils Lake, and Minot. It becomes increasingly difficult to procure speakers who are willing to be away from their work for five or six days, and we are giving considerable thought to the idea of having each society choose its own speaker for the spring of 1959. This would necessitate a speaker spending only one or two days away

from home. Each society will be contacted early this fall for its opinion of this idea.

During the past year, the North Dakota unit of the American Cancer Society has continued the policy of presenting cancer speakers to other organizations in the state. A cancer speaker was furnished for the 1957 state meeting, and a similar speaker will be furnished for the 1958 state meeting at Minot in May. Additional cancer speakers were furnished for the obstetric and gynecologic meeting in Dickinson during the fall of 1957 and also at the North Dakota State Surgical Society meeting in Grand Forks in 1957. We hope to continue this policy as we feel it is more satisfactory when the choice is made by the individual organization. We also plan to furnish a speaker for the State Dental Convention in Bismarek in June 1958. A recent communication from the dental secretary reveals that, to-date, Dr. Kling, of the Quain and Ramstad Clinic, will present a lecture on "Cancer of the Oral Cavity" to the dentists at their state meeting.

A rather feeble attempt was made to investigate rumors of a quack operating in the Underwood, North Dakota, area. Dr. O. R. Bjornlie, a naturopath, was found to be operating a thriving practice in a residential home in Underwood. Several cars were parked on the outside and, upon entering the living room, 12 people were found waiting patiently for the services of Dr. Bjornlie. After waiting for thirty minutes, your investigator left without being able to interview this practitioner. Communications to the attorney general reveal that this office has no information on this man and that there is no provision in the statutes for licensing a person to practice in naturopathy. Communications with Dr. Hochhauser, of Garrison; Dr. Anderson, of Underwood; and Dr. Glaspel, secretary of the State Board of Medical Examiners, reveal that attempts are being made to obtain testimony from disgruntled patients who would be willing to appear and testify in court. Only by this method would we be able to present a sound case and eradicate this quack.

Doctors are again encouraged to cooperate with their local county commanders of the North Dakota Cancer Society by being available as speakers at city and country cancer meetings throughout the year. We have a very fine *Speaker's Handbook* available at our home office in Fargo. These speeches require no previous preparation, may be easily read, and require only ten or fifteen minutes to present. The presence of an M.D. at a cancer meeting enhances the program and adds considerable weight to the authenticity of statements made by lay speakers. Doctors are also urged to remember that we have several Kinescopes on cancer of various areas of the body available for district meetings and also hospital staff meetings. As you know, these are very fine films covering a variety of cancer topics, and are available upon request from our home office in Fargo.

Please do not forget to report your cancer cases.

C. M. LUND, M.D., Chairman

Committee on Geriatrics and Rehabilitation

A meeting of this committee was held in Fargo, December 13, 1957, at the Gardner Hotel. Present were: Dr. Paul Johnson, of Bismarek; Dr. H. C. Walker, of Williston; Dr. Lee Christoferson, of Fargo; Dr. Robert Rodgers, president of the state society; Mr. Lyle Limond, executive secretary of the state society; William E. Unti, executive director of the North Dakota chapter of the Society for Crippled Children and Adults; Miss Frances

Landon, executive director of the Rehabilitation Unit of the North Dakota State Medical Center; and Dr. T. H. Harwood, chairman.

The meeting was called to order at 7:45 P.M. Dr. Harwood and Miss Landon presented the picture of the current status of the Rehabilitation Unit. The physical plan of the Unit is almost completely finished, and equipment is being moved in. Staff members have been appointed, including a secretary, a physical therapist, an occupational therapist, a counseling psychologist, and a prevocational advisor. A social worker will join the staff early in January. A speech and hearing therapist is still being considered.

It was pointed out that the Unit is to be an outpatient facility and that patients will have to be housed nearby and transported daily to the Unit for treatment.

Operating plans at the present time do not provide for a physiatrist on the staff. This is because it is felt that it is very important for the referring physician to be part of the rehabilitation team in actuality as well as theoretically. When a physician refers a patient, as all patients will be referred directly or indirectly, the physician writes orders for the therapies which the patient is to receive. In this way, a close relationship is established with the referring physician. In some areas, problems have arisen when the physiatrist in charge tends to take over the complete care of the patient, as the referring physician feels that he has lost his patient to someone else.

It was also pointed out that the Medical Center Advisory Board has asked that the Committee on Geriatrics and Rehabilitation be the official medical advisory committee on policies regarding doctor-unit relationships.

In the course of the discussion, the following points were brought out:

1. Both evaluation of the patient's situation and treatment would be undertaken. There are many programs in the state in which it is necessary to determine whether a patient is totally and permanently disabled. Such an evaluation could be done at the Rehabilitation Unit. On the other hand, a person might be in need of actual treatment and would, in this case, receive treatment at the Unit.

2. Dr. Rodgers asked how many physicians are qualified to write prescriptions. This point was discussed at some length. Dr. Christoferson felt that he would like to be able to turn his patients over completely to an M.D., have the therapy and management in his hands, and then have the patient back with a report. Dr. Rodgers agreed with this philosophy as did Dr. Walker.

3. Dr. Jensen mentioned that traumatic paraplegies were a big problem in this area as well as in other parts of the country.

4. It was asked what would happen if a patient were referred to the Unit who had no local doctor in charge of his case. It was stated that every effort would be made to find a physician for him who could take charge of his case and refer him as his patient rather than have the individual come to the Unit without a doctor.

5. Dr. Christoferson pointed out that there is a definite gap between the Division of Vocational Rehabilitation and re-employment. This point was generally agreed upon, and it was felt that efforts should be made to bridge this gap. Mr. Unti suggested that employment services should take over at this point.

6. Dr. Walker asked about consultations which might be necessary while the patient was under treatment at the center. Who would call for such consultations? At present, in case a consultation is required, the referring

physician would be contacted and this matter discussed with him so that a consultant of his choosing would be called.

7. The question of referral was brought up again. It was pointed out that we would be working with the Division of Vocational Rehabilitation and with other agencies in the state. Some of these agencies need Rehabilitation Unit services in the course of their programs. In some cases, since it is handling the case, details of referral would be handled by the agency. In each case, however, the agency is already working with the doctor in charge of the patient, and this relationship would continue even though the agency is making the arrangements. The Polio Foundation, Easter Seal Society, Workmen's Compensation, insurance companies, and others might be the agency involved. It was pointed out that every effort will be made to have services paid for by the individual or by an agency. In case all efforts to obtain payment fail, it was felt that the treatment would not be withheld from a North Dakota resident for lack of funds.

8. The question of referrals from allied medical groups, such as osteopaths and chiropractors, was discussed. The general feeling was that we should work with osteopaths. It was further felt that satisfactory relations with chiropractors would be very difficult to establish.

T. H. HARWOOD, M.D., Chairman

Committee on Maternal and Child Welfare

The Maternal and Child Welfare Committee of the State Medical Association met in Jamestown on December 12, 1957, and again in Fargo on March 19, 1958.

The committee submits the following for your recommendation:

1. We recommend that the local county medical societies have periodic polio injections at least every two years.

2. We recommend that a booklet be prepared for all hospitals in North Dakota regarding the proper setup for the care of newborn and premature infants and delivery rooms.

3. We recommend that the outline which is prepared at present by the State Health Department regarding immunizations be brought up-to-date and a copy forwarded to all doctors in the state.

4. The committee feels at present that the best eye prophylaxis is the instillation of silver nitrate. It is safe not to irrigate. If irrigation is done, it should be carried out fifteen minutes after the initial instillation of silver nitrate using distilled water.

5. We do not recommend the use of intramuscular penicillin as an eye prophylaxis.

6. We recommend that all hospitals in the state do perinatal mortality studies with a view to lowering the neonatal mortality.

7. We recommend a review of the adoption laws for North Dakota.

8. The committee submits the following minimal requirements for the filing of adoption papers:

1. History and physical examination of husband.
 - a. Sperm count.
 1. Number per cc.
 2. Motility.
 3. Per cent of abnormal form.
 - b. If substandard, at least 2 more counts.
2. History and physical examination of wife, including pelvic examination.
 - a. Thyroid evaluation.
 - b. Temperature chart—minimum of three months.

c. Endometrial biopsy.

d. Determination of tubal patency by Rubin's test or uterosalpingogram.

e. Cervical factor by Huhner test at midcycle.

3. Is the physician aware of any psychologic factors that would impair fertility?

Note. If absolute sterility found in the male, it is not necessary to give the wife a complete examination.

ROBERT E. LUCY, M.D., Chairman

Committee on Crippled Children

The meeting of the Committee on Crippled Children was held at the Gardner Hotel, Fargo, December 14, 1957, and was called to order at 9:40 A.M. by the chairman, Dr. P. L. Johnson. Members present were: Drs. P. L. Johnson, chairman, A. E. Culmer, Jr., D. T. Lindsay, C. W. Hogan, L. B. Silverman, O. V. Lindelow, R. D. Nierling, and J. C. Swanson. Others present were: Mr. Carlyle O. Onsrud, executive secretary, Public Welfare Board; Mr. William E. Unti, executive director, North Dakota Society for Crippled Children and Adults; and Mr. Lyle A. Limond, executive Secretary, North Dakota State Medical Association.

The chairman opened the meeting by discussing a letter sent out by the Crippled Children's Services and signed by himself on December 20, 1956. This letter contained extension of Crippled Children's Services to include 14 conditions which were previously not covered but for which various counties had requested relief because of financial difficulties, of which the named 14 had been accepted by Crippled Children's Services. Reference was also made to the resolution passed by the Devils Lake District Medical Society criticizing this expanded program as well as our various discussions of the association's House of Delegates as found on page 355 of the October 1957 issue of *THE JOURNAL-LANCET*.

The various members of the committee deliberated about the resolution as well as the changes in the Crippled Children's program. It was felt that the aforementioned letter of December 20, 1956, failed to adequately clarify the degree of continued participation by the local physician in these varied Crippled Children's cases. It was also urged by Dr. Culmer that a previously planned, but not carried out, personal visit by Dr. Icenogle to the Lake Region District Medical Society and to other societies as well should be completed in an effort to further clarify the Crippled Children's program.

Dr. Lindsay stated that he felt that the medical director of the Crippled Children's Services should screen all applications for Crippled Children's Services and that also the case load should be carefully reviewed in an attempt to overcome possible shortcomings, such as acceptance of ineligible people who could well afford to pay for private care either on an insurance basis or as a personal responsibility. He also felt there should be a closer working relationship between the Crippled Children's Services and the referring physician so that the physician can continue to take an active part and be remunerated for his participation in the continued care of the patient.

Dr. Nierling asked if it had been considered whether Fellows of the American College of Surgeons should be eligible to perform surgery under the Crippled Children's program. It was felt that the present requirements for participation should remain intact, namely, that only board physicians and surgeons are authorized as consulting and operating surgeons. Any other qualifications would require arbitrary decisions for which possible injustices would result.

Dr. Silverman opened the discussion regarding the

list of medical conditions included in the extended program of the Crippled Children's Services, and these were discussed individually. He felt that celiac disease should be eliminated and that probably rheumatoid arthritis should also be eliminated except for the specific treatment of various joint deformities. These decisions were concurred in by the majority, and it was recommended that they be eliminated from the list of the acceptable conditions.

Dr. Lindelow stated that he felt that any of the conditions qualifying for Crippled Children's Services should be checked at least once by a specialist who can then assume responsibility for accuracy in diagnosis and that then much of the follow-up care could be carried out by the referring physician.

Dr. Lindsay suggested that an information packet be given all newly licensed physicians in North Dakota to include information regarding Crippled Children's Services, other state agencies of the Public Welfare Board, and other agents as well as other private agencies, such as Blue Cross and Blue Shield.

Dr. Lindsay further commented as follows regarding the Crippled Children's Services program:

1. Greater stress should be placed on the continued participation by the referring physician.

2. The consultant's part in the program should be reduced to the minimum consistent with good care for the child.

3. The Crippled Children's program should be as selective as possible, accepting only eligible new cases, and old cases, which can be financed privately, should be removed from the program.

4. There should be no change in out-of-state referrals, and a specialist who would otherwise be eligible to care for a certain condition should be the one to determine whether a child can or cannot be adequately cared for in the state before recommending out-of-state referral.

5. The varying participation by internists and pediatricians treating crippled children with medical conditions should continue to be interpreted rather loosely and in accordance with local custom.

Mr. William E. Unti's proposal and actions thereto: Mr. Unti explained the purposes of the proposed Industrial Workshop in Jamestown. He asked for this Committee's opinion on this proposal.

Dr. J. C. Swanson moved that the committee approve the proposal of an Industrial Workshop in Jamestown. The motion was seconded by Dr. Lindsay and carried.

Dr. Culmer moved that the council approve the president of the North Dakota State Medical Association appointing a small liaison committee to work with Mr. Unti on the sheltered workshop proposal. Motion was seconded by Dr. Silverman and carried.

Dr. Culmer moved that the committee recommend that a demonstration of one hour be given at an annual meeting in the field of the crippled child. Motion was seconded by Dr. R. D. Nierling and carried.

Meeting adjourned at 12:30 P.M.

P. L. JOHNSON, M.D., Chairman

Committee on Nursing Education

As to the report for the committee on Nursing Education, no formal meeting was called for the year 1957 and 1958 because no apparent business or activity demanded such action. Continued contact with the executive office of the North Dakota State Nurses' Association has been maintained.

The only suggestion from that office was that the North Dakota State Medical Association donate to the state scholarship plan that the Nurses' Association has

adopted. Their funds have not been adequate to cover all of the young ladies who are interested in the nursing profession.

There were no further suggestions from either the committee or the North Dakota State Nurses' Association.

C. R. MONTZ, M.D., Chairman

Committee on Constitution and Bylaws

Herewith is a report of the chairman of the Committee on Revision of the Constitution and Bylaws. In accordance with procedures and directives of the House of Delegates and the council at the 1957 annual session at Fargo, revision of the Constitution and Bylaws has been completed and as of the time of the 1958 annual session, a copy of the Handbook has been mailed to each member of the association.

It appears to the members of the committee that a special committee on revision of the Constitution and Bylaws need not be appointed annually in the future until such a need becomes apparent.

ROBERT B. RADL, M.D., Chairman

Advisory Committee to the Public Assistance Division of the State Welfare Board

Quain and Ramstad Clinic, Bismarck, March 22, 1958. The meeting was convened at 7:50 P.M. by the chairman, Dr. E. T. Keller. Members present were: Dr. E. T. Keller, chairman; Dr. E. J. Larson; and Dr. C. H. Peters. Others present were: Dr. R. W. Rodgers, Mr. Ralph Atkins, and Mr. L. A. Limond.

Mr. Atkins, director, Division of Public Assistance, spoke on ways of reducing costs for public assistance cases as follows:

- a. Children should assume more responsibility in caring for the old folks.

- b. There should be a cut-off date for some drugs—no refills unless expressly ordered by the physician after the cut-off date. Examples of exceptions to this procedure would be for insulin and digitalis. Further study is to be given to this proposal.

- c. The possibility of instituting a flat rate for the chronically ill patient in nursing homes and/or in hospitals is to be studied.

It was tentatively agreed that any period longer than twenty-four hours previous to surgery was to be considered medical and not preoperative.

It was also tentatively agreed that fourteen to twenty-one days could be considered postoperative for the normal surgical procedures.

Many other ramifications of the over-all problem of the public assistance program were discussed at length by the members of this committee.

Meeting adjourned at 10:40 P.M.

E. T. KELLER, M.D., Chairman

North Dakota Joint Commission for the Improvement of the Care of the Patient

The major purpose of this commission is to stimulate, implement, assist in, and sponsor activities which will contribute to the care of the patient as may be mutually satisfactory to the appointing organizations.

To achieve this objective, the commission performs as a service agency to the parent organizations. It shall be the intention of the commission to obtain a better understanding of the problems and programs of all represented groups; to serve as a source of information on trends within the programs of the participating organizations; to explore the needs for and stimulate studies in areas of patient care in which the organizations participate; and to perform such functions and carry on

such activities contributing to the major objectives as may be mutually satisfactory to the appointing organizations and to the commission.

I have met with this group twice and find that the committee is primarily made up of nurses and an occasional hospital administrator. They have spent most of their time talking about the development of the licensed practical nurses' program in North Dakota and some time on the subject of increasing the training programs for the University of North Dakota student nurses.

R. O. SAXVik, M.D., Representative

Liaison Officer to the North Dakota State Dental Association

Your liaison officer met the secretary of the State Dental Association and Mr. Earl Abrahamson in November. The background for this meeting was the dentists' general dissatisfaction with the fee schedule of the North Dakota High School Athletic League, of which Mr. Abrahamson is secretary. The Dental Association through their secretary, Dr. Jack Pfister, requested your liaison officer to sit in on the meeting with the feeling that perhaps a combined effort could be made in attempting to revise the current fee schedule of the league. Mr. Abrahamson stated that though the insurance of the league was not meant to be a total payment for injury, he felt that the fee schedule should be revised and he would be pleased to meet the medical and dental professions in such an effort. Your liaison officer reported this to our state office and respectfully suggested that the matter be given to the Medical Economics Committee for action. I can report at this time that the Dental Association has met the Athletic League and has obtained substantial increases in their fees.

The Dental Association has asked to express their pleasure with the appointment of a liaison officer to their society, and also they wish to express their sincere desire to work hand in hand in all ways possible with the State Medical Association in all problems of mutual interest. They have expressed a particular desire to have a close liaison during the coming legislative year.

DAVID G. JAEHNING, M.D., Liaison Officer

Report of Representative to the Governor's State Health Planning Committee

The State Health Planning Committee held its usual 2 meetings in 1957. The first was held June 5 in Bismarck to consider the over-all basic policy and priority principles to be used for 1958 in the state plan for construction of hospital and medical facilities in which Hill-Burton and related funds are to be used. The basic policy is governed to a considerable extent by United States Public Health Service regulations and recommendations regarding general hospital bed needs per population, the location of nearby hospital facilities, the general need of an area for nursing home facilities, and specialized hospital facilities in connection with already existing hospitals.

In brief, the current general philosophy adopted by this committee is that very few new hospital beds are needed in North Dakota. There is need to modernize and approve facilities in certain areas already having hospitals and possibly to expand some existing facilities.

At the present time, nursing home facilities are greatly needed in most areas of the state. A number are under construction and in the planning stage. We are advised that several hospitals in the state are taking nursing home type patients at reduced rates, partly to fill a need but also to augment their incomes.

On September 24, 1957, also at Bismarck, the meet-

ing of the committee was held to hear the applications of numerous communities and groups for aid for general hospital and nursing home construction, rehabilitation facilities, and neuropsychiatric facilities. Recommendation was made to the State Health Council for Hill-Burton and related funds to be used on a 46 per cent federal and 54 per cent local basis for the following projects:

1. A 50-bed general hospital to replace the existing 30-bed St. Aloysius Hospital at Harvey.
2. A 40-bed nursing home addition to the Lutheran Home for the aged at Grand Forks.
3. A 55-bed nursing home addition to the Lutheran Home for the aged at Minot.
4. The extension and addition of rehabilitation facilities at the Jamestown Children's School.

An extra meeting of the State Health Planning Committee together with the State Health Council was held on January 16, 1958, also in the Capitol Building at Bismarck. The purpose was to hear a well arranged program presented by members of both groups and others, covering such items as rural and urban population trends in North Dakota in relation to hospital and related facility needs, hospital nursing home and domiciliary home needs in North Dakota, present and future hospital needs, staffing and operational problems of North Dakota hospitals, problems of providing medical services to rural communities, and proposed means of meeting the various problems under discussion.

This was an interesting and valuable meeting.

Your representative has been impressed with the general intelligence and knowledge regarding health needs of North Dakota by the committee members, by the seriousness with which they undertake their duties, and by the lack of political consideration evidenced in the various discussions and decisions made. The work of this committee would be much more pleasant if we had enough Hill-Burton and related funds to allow funds to be granted to all applicants, as the vast majority of the requests for funds are for worthwhile community projects. Such not being the case, the committee seriously weighs all factors involved before making its recommendation to the State Health Council.

In the budget proposal to the present Congress, the president has recommended a substantial reduction in the Hill-Burton funds. Thus, unless Congress in this election year does not follow the administration recommendations, we can anticipate an appreciable reduction in the amount of funds available from the federal government for future projects.

PHILLIP H. WOUTAT, M.D., Representative

Committee on Medical Education

This committee had a meeting in Fargo on May 26, 1957. It will hold another meeting at 8:30 A.M., May 4, 1958, in Minot.

At the meeting on May 26, various phases of the medical school were discussed.

The possibility of the medical school arranging short courses of one to three days' duration was discussed. It was felt that the medical school could put on some short courses in the basic sciences, and that it would be possible to include some clinical papers in these courses. It was felt that it might be possible to bring in 1 or 2 outside speakers for some of these short continuation courses.

The committee, therefore, recommended that Dean Harwood try to arrange in the future to conduct some continuation courses at the medical school.

In a letter of April 3, 1958, Dr. Harwood reports on the medical school and its activities as follows:

"The School of Medicine received its annual contribution from the American Medical Education Foundation in March this year. The contribution was \$3,945. This figure is down a bit from last year.

"Our student applicant problem is one of our most serious ones. Last year, at the time of the report, it seemed as though our applicants were in goodly number, but by the time school began, we had scarcely enough students to fill our instate quota of 36. We do not lack applicants actually in gross number, but we do lack applicants who have grades equal to the University average. The School of Medicine has not yet thought it wise to accept students below average scholastic achievement in college work.

"Forty-one first-year students were admitted in September 1957. These consisted of 37 instate students and 4 out-of-state students. At the present time, we have 35 left. Two students withdrew and 4 failed, making a total loss of 6, which in terms of percentage is well above the national average.

"The Medical Center Loan Fund was used this year by 22 third-year and 8 fourth-year students who borrowed a total of \$54,500 from this fund. In addition to this, the entire amount of the Woman's Auxiliary Loan Fund was used, the amount requested by 12 students being reduced from \$600 to \$500 so that it would go around to all the individuals.

"The Rehabilitation Unit was completed in January of this year and has been in operation since that time. Our patient load has been light but is growing steadily.

"Plans for the construction of a tuberculosis hospital at the University are still being discussed with many pros and cons.

"Our graduating class of 36 last year all transferred as follows: Bowman Gray—3; Columbia—1; Harvard—2; Illinois—1; Kansas—11; Marquette—1; McGill—2; Northwestern—4; Pennsylvania—4; Southwestern—3; Tufts—1; Tulane—1; and Washington—1.

"It is our understanding that 5 of our graduates of 1956 are returning to North Dakota to intern this coming July."

You will note in Dr. Harwood's letter that it is a problem to obtain enough good student applicants. I think the doctors in North Dakota could assist in this problem if they would encourage good students interested in medicine to apply for admission to the North Dakota Medical School.

H. M. BERG, M.D., Chairman

Report of the Representative to the Medical Center Advisory Council

The Medical Center Advisory Council has held 2 meetings since the last report—June 15, 1957, and January 25, 1958—both of which your representative attended. The following are pertinent transactions.

1. *The tuberculosis hospital.* You will recall that the 1957 state legislature contemplated the construction of a new tuberculosis hospital of approximately 100 beds in connection with the Medical Center and instructed the Medical Center to retain approximately \$600,000 in funds to aid the construction of this facility.

Under the auspices of the State Board of Administration, a recent survey of the state's tuberculosis hospital needs was made by Dr. Cedrie Northrop, the State of Washington Tuberculosis Control officer; and Dr. Robert Davies, director of the State of Florida Tuberculosis Board. These gentlemen appeared before the Medical

Center Advisory Council at the January 25 meeting with a preliminary report of their impressions. While their final report is not available, they feel that many factors would make it unwise for us to construct a new tuberculosis facility. The census at San Haven has been reduced to 37 at the present time. Some of this reduction results from diverting Indian patients to a federal facility in South Dakota. Some is also the result of modern treatment methods, which reduce the hospitalization period from a number of years to a few months. It was brought out that since May, 1957, the hospitalization needs for tuberculosis patients have been drastically reduced. It was the preliminary impression of the surveyors that it would be more advisable to contract for hospital beds in another facility in the state and provide for all the tuberculosis bed needs in that way. St. Michael's Hospital in Grand Forks was reported to be possibly interested in such a plan. The final decision on this matter, of course, is somewhat in the future, pending the final report of the surveyors, action by the State Board of Administration, and probably by the next legislature.

2. *Medical Center and University of North Dakota Nursing program.* Miss Margaret Heyse, director, Division of Nursing, University of North Dakota, appeared before the council with recommendations for expanding the University's Nursing School program. It is proposed that the present educational program for providing nursing education on the University level be expanded with the object of training more teaching and supervisory nursing personnel. There appears to be a need for such expansion, and it appears that the University Nursing School should probably take the responsibility for such a program. Accordingly, The Medical Center Advisory Council recommended that such an expansion be instituted. One word of caution must be introduced. This expansion appears to call for closing the present three-year program in Deaconess Hospital, Grand Forks, and using these facilities for training nurses in the expanded four-year University program if the school is to be fully approved. Your representative recalls some of the problems that have arisen in the state in the past due to closing of three-year nursing schools in some of the smaller hospitals and the present shortage of bedside nurses, which appears to be statewide and is not improving. Whether an expanded four-year program at the University of North Dakota would completely fill the gap caused by abolishing the three-year program in Deaconess Hospital is not clear, and it does not appear to be advisable to abolish such a school until full replacement is available.

It is contemplated that by using other facilities in North Dakota, such as the State Hospital at Jamestown and the State School at Grafton, a four-year program could be completely carried out within the confines of the state. It is hoped that this will result in keeping more graduate nurses within the state following graduation.

3. *Rehabilitation program.* The staff at the Rehabilitation Unit at the Medical Center has been functioning since January 6, and the first patient was seen January 13. The staff is composed of Miss Frances Landon, director; a counseling psychologist, a physical therapist, an occupational therapist, a social worker, and a prevocational supervisor as well as the usual office personnel.

Doctor Olmstead, a qualified physician in internal medicine and on the teaching staff at the medical school and the Student Health Service physician, is acting as medical consultant for patients admitted.

As previously reported, the Rehabilitation Center in-

tends to take only patients referred by a physician and/or a state agency, such as the State Welfare Board. A program of information for physicians around the state is being undertaken.

It has been brought out that there may in the future be need for housing facilities for patients spending any length of time at the Rehabilitation Center for examination or treatment. It has been proposed that another story be added to the Rehabilitation Unit to afford housing and kitchen facilities for adults and children during such a period of stay.

The Medical Center does not have funds for such an addition, so, if such becomes necessary, it would have to be constructed somewhat in the future.

4. *Biochemistry service.* The use of the Biochemistry Laboratories at the Medical Center by the physicians of North Dakota for specialized tests has been increasing rapidly and has become an expense necessitating the addition of technical personnel, equipment, and chemicals. The load has reached such a point that the Medical Center Advisory Council recommended that a fee schedule be set up for biochemistry services and that it be recommended to the Board of Higher Education that a charge be made for these tests on a nonprofit basis. We expect this to be instituted within the next few months.

5. *Medical Center loan fund.* You will recall that the 1957 legislature directed that \$75,000 of Medical Center funds be made available each year for loans to medical students to enable them to complete their education. You will also recall that certain provisions were made to encourage graduates to return and practice in the smaller communities of North Dakota. To date, \$53,000 of Medical Center funds has been loaned to 19 juniors and 8 seniors. The medical school anticipates a similar amount to be loaned again this year.

6. *Psychiatric training program.* To date, there have been no applicants for this program.

7. *Admissions.* To date, there has been a total of 85 applicants for the freshman medical school class for the fall of 1958. Fifty-one of these are North Dakota residents. It does not appear that the class of 40 students will be filled with North Dakota residents, so some out-of-state students will, no doubt, be accepted. As of January 25, 1958, 21 North Dakota students have been accepted.

There is no problem in transferring graduates to other schools for their third and fourth year of training.

It might be pointed out here that, whereas a few years ago two-year medical schools were being frowned upon and discouraged to a considerable extent, there are indications that attitudes are changing and that two-year schools will receive more encouragement. Some four-year schools have recently announced that they will be able to give adequate training to more third- and fourth-year medical students than they are able to take in their first two-year classes, and it is apparently being recognized in some places that the first two years of medical school can adequately be taught in two-year schools, probably at considerably less expense than in some of the larger schools.

8. *Postgraduate courses.* A three-day postgraduate course for doctors is being planned for November, 1958, in cooperation with the Academy of General Practice of North Dakota. This is contemplated to be a course correlating the basic sciences with clinical medicine.

9. *Cancer Research Laboratory.* The Medical Center has received a gift of \$75,000 from Mrs. Bertha Ireland of Grand Forks for a Cancer Research Laboratory. Fed-

eral matching funds of \$75,000 have been obtained. Plans are underway for a separate building for this project, and grants have been obtained for stipends for investigators. It is contemplated obtaining a full-time established investigator to direct the work in this laboratory.

PHILLIP H. WOUTAT, M.D., Representative

Report of the Delegate to the American Medical Association

Your delegate attended all meetings of the House of Delegates during 1957. In addition, he continues to serve the association in a number of other capacities.

A complete report of the transactions of the House of Delegates appears in the J.A.M.A., covering both the annual session in New York and the clinical session in Philadelphia. Some of the more important actions taken by the House are as follows:

Dr. Gunnar Gundersen, of LaCrosse, Wisconsin, a long-time member of the Board of Trustees and well known to physicians in this area was unanimously elected president-elect for 1958 and will assume office as president in June 1958. Dr. David Allman of Atlantic City is currently serving as president.

Every year the House of Delegates votes a distinguished service award to an outstanding American physician. This year it was given to Dr. Tom Douglas Spies, head of the Department of Nutrition and Metabolism at Northwestern University School of Medicine in Chicago, widely known for his outstanding contribution to the science of human nutrition. The House also voted a special citation to a nonmedical man for outstanding service in advancing the ideals of medicine. The recipient of this award was Henry Viscardi, Jr., founder and president of Abilities, Inc., which employs only severely disabled persons.

The House adopted the long discussed revision of the principles of medical ethics. The new principles of medical ethics read as follows:

"These principles are intended to aid physicians individually and collectively in maintaining a high level of ethical conduct. They are not laws but standards by which a physician may determine the propriety of his conduct in his relationship with patients, colleagues, members of allied professions, and the public.

"Section 1. The principal objective of the medical profession is to render service to humanity with full respect for the dignity of man. Physicians should merit the confidence of patients entrusted to their care, rendering to each a full measure of service and devotion.

"Section 2. Physicians should strive continually to improve medical knowledge and skill and should make available to their patients and colleagues the benefits of their professional attainments.

"Section 3. A physician should practice a method of healing founded on a scientific basis; and he should not voluntarily associate professionally with anyone who violates this principle.

"Section 4. The medical profession should safeguard the public and itself against physicians deficient in moral character or professional competence. Physicians should observe all laws, uphold the dignity and honor of the profession, and accept its self-imposed disciplines. They should expose, without hesitation, illegal or unethical conduct of fellow members of the profession.

"Section 5. A physician may choose whom he will serve. In an emergency, however, he should render service to the best of his ability. Having undertaken the care of a patient, he may not neglect him; and, unless he has been discharged, he may discontinue his services

only after giving adequate notice. He should not solicit patients.

"Section 6. A physician should not dispose of his services under terms or conditions which tend to interfere with or impair the free and complete exercise of his medical judgment and skill or tend to cause a deterioration of the quality of medical care.

"Section 7. In the practice of medicine, a physician should limit the source of his professional income to medical services actually rendered by him, or under his supervision, to his patients. His fee should be commensurate with the services rendered and the patient's ability to pay. He should neither pay nor receive a commission for referral of patients. Drugs, remedies, or appliances may be dispensed or supplied by the physician provided it is in the best interests of the patient.

"Section 8. A physician should seek consultation upon request, in doubtful or difficult cases, or whenever it appears that the quality of medical service may be enhanced thereby.

"Section 9. A physician may not reveal the confidences entrusted to him in the course of medical attendance, or the deficiencies he may observe in the character of patients, unless he is required to do so by law or unless it becomes necessary in order to protect the welfare of the individual or of the community.

"Section 10. The honored ideals of the medical profession imply that the responsibilities of the physician extend not only to the individual but also to society where these responsibilities deserve his interest and participation in activities which have the purpose of improving both the health and the well-being of the individual and the community."

For many years, as has been frequently pointed out in these annual reports, the basic problem affecting the practice of medicine today is that of third-party intervention and control of medical practice. Despite vigorous efforts on the part of the profession, there has been a gradual encroachment on the field of professional control of medical practice. During the past number of years, various local medical societies have been experiencing difficulties with the operations of the United Mine Workers of America Welfare and Retirement Fund. This fund was set up to provide medical and other welfare services to members of the United Mine Workers Union, and, in the beginning, medical care was paid for on a "fee for service with free choice of physician basis." Over a period of years, this concept has been abandoned by the directors of the fund, and they have in recent years dictated who may or may not treat a recipient of aid from the hospitals providing care to mine workers. This, of course, has resulted in a disruption of the patient-physician relationship. At the New York meeting, there was an intense, bitter discussion of this problem, which resulted in the acceptance by the A.M.A. but not by the UMW of a set of guides outlining both medical society and UMW responsibilities. These guides may be summarized as follows:

1. All persons, including the beneficiaries of a third-party medical program such as the UMW Fund, should have available good medical care and should be free to select their own physicians from among those willing and able to render such service.

2. Free choice of physician and hospital by the patient should be preserved:

- a. Every physician duly licensed by the state to practice medicine and surgery should be assumed at the outset to be competent in the field in which he claims to be, unless considered otherwise by his peers.

- b. A physician should accept only such terms or conditions for dispensing his services as will insure his free and complete exercise of independent medical judgment and skill, insure the quality of medical care, and avoid the exploitation of his services for financial profit.

- e. The medical profession does not concede to a third party, such as the UMW Welfare and Retirement Fund, in a medical care program the prerogative of passing judgment on the treatment rendered by physicians, including the necessity of hospitalization, length of stay, and the like.

3. A fee-for-service method of payment for physicians should be maintained except under unusual circumstances. These unusual circumstances shall be determined to exist only after a conference of the liaison committee and representatives of the fund.

4. The qualifications of physicians to be on the hospital staff and membership on the hospital staffs are to be determined solely by local hospital staffs and by local governing boards of hospitals.

The House of Delegates reiterated their opposition to compulsory inclusion of physicians in the federal social security system. They continued their support of legislation of the Jenkins-Keogh type.

At the December session in Philadelphia, the delegates gave unqualified endorsement to fluoridation of water as an aid to the prevention of dental caries.

The delegates continued to support the issue of free choice of physician and opposition to third-party intervention and control. The following resolution introduced by the delegate from South Dakota was adopted, "Resolved that the House of Delegates affirm that it is within the limits of ethical propriety for physicians to join together as partnerships, associations, or other lawful groups, provided that the ownership and management of the affairs thereof remains in the hands of licensed physicians.

The most important matter considered this year had to do with the entire reorganization of the A.M.A. structure. As has been previously reported, the A.M.A. employed a firm of management consultants, Robert Heller and Associates, to advise on improvement of the business methods of the association. This report was received and, in the main, adopted, resulting in a reorganization of the offices of the association somewhat along the following lines. The office of secretary and treasurer will be combined and will be selected from one of the Board of Trustees. The office of general manager will be discontinued and a new office of executive vice-president established. This has all been done and former general manager, Dr. George Lull, who is known and revered by all physicians in America, will remain as a consultant and the position of executive vice president will be filled by Dr. F. J. L. Blasingame. Various other changes in the organizational structure were effected, perhaps the most important of which was the appointment of a new business manager who will reorganize the business structure of the organization. In addition, the Board of Trustees intends to spend a considerable sum of money renovating the headquarters at 535 North Dearborn. It intends to put in air conditioning and other improvements so that the building will be more modern and more functional.

Probably one of the most serious threats to American medicine today consists of the proposals embodied in the Forand bill and other related changes which would extend medical benefits to certain social security recipients. The A.M.A. has organized a strong group which will not only vigorously oppose such ill conceived suggestions as those embodied in the Forand bill but will vigorously

propose constructive alternatives. As everyone in our association knows, one of the pressing problems affecting medical practice today is the proper care of the aging population. Doctors individually and the A.M.A. have been vigorously investigating the problems involved in care of the aged. In this they have not only been concerned with the medical problems but have also considered the various social and economic factors involved. The A.M.A. Committee on Aging and other portions of the organization have cooperated with other groups interested in this particular field. The type of constructive approach, which will undoubtedly be favored by our association, will be along the line of an attempt to extend insurance benefits to the aging, a program of providing proper facilities for the care of the aging who do not need general hospital care, a program for the provision of assistance and some type of care in the home where that is possible. Other programs are under consideration, and it seems likely that improvement in the over-all care of the aging will result from these efforts.

In the legislative field, it is humiliating to note that a representative from North Dakota has introduced an anti-vivisection bill in the Congress.

It is the feeling of many of us who have been actively engaged in the work of the A.M.A. for a number of years that, during the past, there has been a revitalization of its efforts. We believe that the association is going forward more actively than ever to work for those things which are in the best interest of the medical profession and the people of our country. Certainly it can be said that the A.M.A. deserves the strong support of every doctor.

W. A. WRIGHT, M.D., Delegate

Committee on Necrology and Medical History

*Alas for him who never sees
The stars shine through the cypress-trees!
Who, hopeless, lays his dead away,
Nor looks to see the breaking day
Across the mournful marbles play!
Who hath not learned, in hours of faith,
The truth to flesh and sense unknown,
That Life is ever Lord of Death
And Love can never lose its own!*

JOHN GREENLEAF WHITTIER

WILLIAM W. WOOD, M.D.

Dr. William W. Wood, 77, for many years a physician in Jamestown and one of the founders of the Jamestown Clinic, died May 1, 1957, in Fort Worth, Texas.

Dr. Wood went to Jamestown June 1, 1909, from Jasper, Minnesota, where he had practiced briefly after graduating from the University of Illinois Medical College and serving as intern in 2 hospitals.

For twenty-five years, Dr. Wood was treasurer of the North Dakota State Medical Association and was a Fellow of the American College of Surgeons. He was a member of a number of medical societies.

Failing health led Dr. Wood to retire several years ago, and he usually spent the winters in San Antonio and Fort Worth and the summer months at Jamestown and on Detroit Lake.

He was a member of the Elks, the Masons, and the Shrine.

He was the son of Mr. and Mrs. James M. Wood, natives of Scotland. He married Miss Mollie Hansen, a native of Denmark, and they became parents of 2 sons who became physicians. They are Dr. William W. Wood, Jr., Fort Worth, and Dr. Robert A. Wood, Sheboygan, Wisconsin. Mrs. Wood and the sons survive.

HENRY M. WALDREN, JR., M.D.

Dr. Henry M. Waldren, Jr., 55, of Drayton, died suddenly in his home July 2, 1957.

Dr. Waldren was born in Drayton, the son of Dr. and Mrs. H. M. Waldren, Sr. After completing his public school education at Drayton, he attended the University of North Dakota. He graduated from Northwestern University in 1925 with a doctor of medicine degree and interned the next two years at Charity Hospital, New Orleans. He then returned to Drayton and began the practice of medicine with his father.

Since the death of his father several years ago, he had been chief physician and surgeon at the Drayton Hospital, which his father operated for many years.

Dr. Waldren was prominent in civic activities. He served several years as Pembina county health officer and was a member of various Masonic organizations, having served as North Dakota Masonic district deputy for four years. He was city health officer at Drayton at the time of his death. He was a member of Sigma Nu social fraternity, Phi Beta Pi medical fraternity, and was a charter member of the American Academy of General Practitioners of North Dakota at the time of his death.

He is survived by his wife, a daughter, and a son, Dr. H. M. Waldren, Jr., of Milwaukee.

ADRIAN E. DONKER, M.D.

Dr. A. E. Donker, 75, retired physician and surgeon of Carrington, died July 29, 1957. He had been in failing health for five years.

A graduate of the University of Michigan, Dr. Donker came to North Dakota in 1913, practicing at Sykeston until 1923 when he went to Carrington.

He was a former member of the Tri-County District Medical Society and retired from active practice in 1947.

He is survived by his second wife and 2 daughters.

WALTER H. GILSDORF, M.D.

Dr. Walter H. Gilsdorf, 56, of Valley City, died on September 20, 1957, in a local hospital after suffering a heart attack earlier in the day.

Dr. Gilsdorf was born June 26, 1901, in Wabasha, Minnesota, and was graduated from high school there. He graduated from the University of Minnesota School of Medicine in 1931 and practiced two years in Dickinson, North Dakota, and twelve years at New England, North Dakota, before coming to Valley City in 1945.

Dr. Gilsdorf was a member of the Valley City school board and the Community Chest board and was a director of the Fidelity Savings and Loan Association. He was chairman of the health and safety program of the Red River Valley Council of Boy Scouts and past chairman of the Barnes district. He was a trustee of Our Saviour Lutheran Church in Valley City.

He was a member of state and national medical groups, the Elks lodge, and Knights of Pythias. For several years, Dr. Gilsdorf was active in the affairs of the North Dakota State Medical Association. He was a member of the House of Delegates for several years and, at the time of his death, was the councillor for the Sheyenne Valley District Medical Society.

Surviving are Mrs. Gilsdorf and 4 sons, Walter, a student at Harvard University; Robert and John, students at the University of North Dakota; and James, who is at home.

KENNETH M. MURRAY, M.D.

Dr. K. M. Murray, of Scranton, died at his home December 21, 1957. He was 77 years old. He was born December 21, 1880, in Woodstock, Ontario, where he

received his education. Upon completing his course of instruction required to receive a teacher's certificate, he taught school for several years. The desire to study medicine had been strong in him since he was a boy, and, thus, he found himself entering the University of Toronto and graduating with the class of 1909.

In 1910, he came to Scranton and had been the family doctor for hundreds of families there ever since. He had been a member of the Southwestern District Medical Society and the North Dakota State Medical Association since 1924. In 1955, when Dr. Murray had practiced in Scranton for forty-five years, the community put on a celebration and named the park "Murray Park."

He is survived by his wife and an adopted son.

JOHN G. LAMONT, M.D.

Dr. John G. Lamont, former superintendent of the Grafton State School and before that of San Haven Sanatorium at Dunseith, died January 7, 1958, in Oklahoma City, where he had lived since his retirement in 1953. He was 87 years old at the time of his death.

Dr. Lamont, a native of Ontario, received his medical degree in Trinity University Medical College in Toronto and served as house surgeon in Toronto General Hospital before coming to Cando, North Dakota, in 1901. He practiced at Cando eleven years before his appointment as superintendent and medical director at San Haven, where he served sixteen years. He became superintendent of the Grafton State School in 1939.

Throughout his adult life, he was active in professional and fraternal organizations. He was a "50-Year Club" member and an honorary member of the North Dakota State Medical Association.

He is survived by his wife and 3 daughters, Mrs. Chilton Powell, wife of the Episcopal bishop of Oklahoma; Joyce, of Minneapolis; and Alwyn, of Detroit.

EDWARD S. O'HARE, M.D.

Dr. Edward S. O'Hare, 71, Esmond physician for many years, died February 7, 1958, in Tacoma, Washington. Dr. O'Hare was stricken by a heart ailment while visiting a daughter.

Born in Minneapolis, Dr. O'Hare graduated from the University of Minnesota School of Medicine in 1914.

He had been a general practitioner and a branch-line surgeon for the Northern Pacific Railway at Esmond for thirty-three years. He was a former member of the Devils Lake District Society.

Dr. O'Hare's wife preceded him in death. He leaves 2 sons and 4 daughters.

E. H. BOERTH, M.D., Chairman

Committee on Public Health

A joint meeting of the Public Health Committee and the North Dakota State Health Council was held at the Capitol Building, Bismarck, September 22, 1957.

The purpose of this meeting was to make recommendations necessary to cope with Asian influenza should it develop in epidemic form in North Dakota.

The use of influenza vaccine in maximum amounts was advised as it is the only known preventive. Emphasis was placed on the fact that the vaccine was distributed through regular pharmaceutical channels and that the North Dakota State Department of Health has no funds for purchase or distribution of the vaccine.

The 6 manufacturers of Asian influenza vaccine were allocating the vaccine to the states on the basis of population. North Dakota received .4 of 1 per cent of the total available commercial supply.

The recommendations of the A.M.A. and the State and Territorial Health Officers Associations were to be effective during the short supply. These were as follows—priorities being given to: (1) individuals whose services are necessary to maintain the health of the community, (2) individuals who are needed to maintain other basic community services, and (3) persons with tuberculosis and others who, in the opinion of the physician, constitute a special medical risk.

It was pointed out that studies in military services revealed that the present vaccine with 1 injection per individual is about 70 per cent effective.

Contraindications to the use of the vaccine were noted, such as sensitivity to eggs, chickens, or chicken feathers.

Hospital beds were to be reserved for those with complications.

The North Dakota State Health Department was encouraged to prepare and distribute educational material on home care of influenza cases.

District medical associations, local communities, and local health organizations were advised to make any preparation necessary in case influenza should strike a community.

No recommendations were made concerning dosage and method of administration of the vaccine.

The group appointed the following as a state advisory committee on influenza to function through the North Dakota State Health Department and the North Dakota State Medical Association in case of an epidemic in North Dakota: Dr. Percy L. Owens, chairman, Bismarck; Dr. G. R. Richardson, Minot; Dr. M. S. Jacobson, Elgin; Joe Halbeisen, druggist, Fargo; Sister M. Angele, Garrison Community Hospital; and W. Van Heuvelen, executive officer, State Health Department, Bismarck.

Your chairman has continued to function on the poliomyelitis vaccine advisory committee, receiving stated reports from the Preventable Disease Division of the State Health Department. Whereas, heretofore the problem was that of insufficient vaccine, we have now a sufficient amount but an apathy on the part of the public to take advantage of it.

Latest statistics as of February 28, 1958, show the total eligible population to be 413,085, and only 222,229, or 55.4 per cent, have received the first dose; 201,632, or 48.8 per cent, have received the second dose; and 135,027, or 32.6 per cent, the third dose.

It is hoped the publicity on a national, state, and local level will increase the number of persons receiving the vaccine before the polio season rolls around.

As there is no venereal disease committee, the State Health Department has asked me to report that 24 cases of syphilis and 176 cases of gonorrhea were reported in 1957. The cases of syphilis are tabulated as follows: primary and secondary—0, late latent—9, neurosyphilis—1, congenital—1, early latent—2, late tertiary—8, cardiovascular—1, and not given—2.

Your chairman does not attempt to draw any conclusions from these figures except to note that gonorrhea and syphilis are still with us but in tremendously reduced numbers.

PERCY L. OWENS, M.D., Chairman

Committee on Official Publication

The Committee on Official Publication held no meetings during 1957.

At the annual meeting of the North Dakota State Medical Association, held in Fargo in May, 1957, the House of Delegates voted for a three-year contract with THE JOURNAL-LANCET. The contract still has two years to run.

The committee will welcome any suggestions if any member of the association desires any change in THE JOURNAL-LANCET regarding publication, number of reprints of articles, and so forth.

E. H. BOERTH, M.D., Chairman

Committee on Legislation

This year the Legislative Committee has held no specific meeting as of March 18, 1958. There has been no specific need for a comprehensive legislative meeting of the committee, since there is no legislative session in North Dakota this year. Next year we are faced with another session and with the possibility of many legislative actions by the legislature. A meeting of this committee is slated for March 30 for the purpose of discussing the Forand bill with an A.M.A. representative. Primarily, the legislative activity of your chairman has been to watch over what national legislation may be in the hopper in Washington and to contact the North Dakota delegation of representatives and senators from this state in Washington relative to the specific national legislative bills.

One of the bills at the present time that will be before the House very shortly is the Forand bill which might affect the practice of medicine considerably. If this bill is passed, it would in all eventualities grant full medical and hospitalization care for any individual who is receiving social security and, hence, would be a rather rapid step toward full socialization. In the bill, one specific clause has been set up for the specific purpose of setting physicians against each other by allocating certain privileges to specific classes of physicians and not the same privileges to another group. This, of course, is discrimination, which we can expect with any socialized legislation. It is simply an indication of what full socialization may, and would do, to the average physician. Those who are good politicians would definitely have the advantage over those whose public relations might not be quite as finely polished. Likewise, there is little question about the fact that specialists would be granted certain privileges which general practitioners would not receive. Whether this is good or bad is not for me to report in this report. You may draw your own conclusions.

Another bill which is to again be considered within this next Congress is the Jenkins-Keogh bill, granting the physician the privilege of setting aside a certain percentage of his earnings for retirement. This is done in view of the fact that the physician is not included in social security. He has not been included because of his desire to be left on the outside, and I am in accord with such a decision. It is the impression and opinion of your chairman that, should we accept any privileges including social security, we would simply be advancing one step closer to and condoning socialized medicine.

O. W. JOHNSON, M.D., Chairman

Committee on Public Relations

The chairman of the Committee on Public Relations; Dr. Rodgers, the state president; and Mr. Lyle Limond, the executive secretary, attended the Public Relations Conferences at the Drake Hotel in Chicago, which were again sponsored by the A.M.A.

We received valuable help and aid in promoting a sound basis of public relations both on the state society level as well as on the local level. With this as a base, Mr. Limond has given several talks on the matter of public relations, especially with the view to the physicians' office personnel. Fortunately, the majority of the other states have far different problems than we find here in North Dakota, and our activity has been mostly

confined to the national political scene in cooperating with the public relations department in the A.M.A. headquarters.

Mr. Limond has been to several meetings, including the press and legal conferences, and has submitted our relationships very effectively. On the local level, we have carried out career night plans for youngsters with several physicians participating, and several talks have been given at local P.T.A.'s and clubs.

We have also in the past month been responsible for disseminating literature to various television newscasts throughout the state and bringing to the attention of the public the recent National Health Week.

I believe this committee has been very effective in promoting a joint understanding between several professional groups throughout the state and has succeeded in acquiring favorable publicity from local television and radio networks.

JOHN T. CARTWRIGHT, M.D., Chairman

Committee on Medical Economics

Most of the accomplishments of this committee took place at our fall meeting on October 19, 1957, in Bismarck.

Union Life Insurance Company representatives presented to this committee a group plan for life insurance for the doctors of the North Dakota medical society. This plan presents a good deal of saving on life insurance, and it was adopted by the committee and later by the council of our state society. It requires no evidence of insurability, and its premium rates on the group basis are much cheaper than a comparable nongroup policy. Dividends will be payable to the North Dakota State Medical Association and their ultimate disposition is at the discretion of the association.

Mr. Ralph Atkins explained the change in vendor payment procedures in public assistance cases. The doctor of medicine no longer receives vendor payments. The payments for medical care (physician services) go directly to the recipient, and the recipient is to pay the doctor. Matching money would be lost if the doctor was on the vendor payment, according to the recent change in the Social Security Law. All doctors in the state have received a letter to this effect.

Dr. Foster moved that the House of Delegates of the North Dakota State Medical Association seriously consider passing a resolution urging the A.M.A. to make efforts to have an amendment to the Social Security Act passed in Congress, which would return to the program of complete vendor payments. Motion was seconded by Dr. Mahoney and carried.

Discussion turned next to the proposal of drawing up a relative value schedule in North Dakota for the classifications of (a) medical services, (b) surgery, (c) radiology, and (d) pathology. Dr. Peters moved that the North Dakota State Medical Association adopt a relative value schedule based, in principle, upon the California Medical Association's relative value schedule and that the schedule be subject to revision in the future as felt necessary in the light of experience by the Committee on Medical Economics. This proposal was seconded by Dr. Borland and carried.

This relative value fee schedule in no way sets anyone's fees or anyone's schedule of fees. What it does do is create a list of relative values which are not expressed in dollars but are expressed in units. These units in each procedure can be converted into dollars by the use of a conversion factor. The conversion factor for private fees can be determined by the physician to meet that which he wishes to charge patients in the territory in

which he practices and may be changed at any time to compare with the economic situation of the time. The advantages of this system are many. Expressed in units, it may be used as a guide in setting up governmental schedules and private fee schedules by using a conversion factor to meet the schedule desired. An entire governmental or private schedule may be changed to meet the conditions of the time by changing only the conversion factor. It does not require a complete revision of the entire schedule. It gives a true relationship or relative value that one procedure bears to another and in no way dictates the private fees to be charged. These are determined by the physician himself in the conversion factor he chooses to use.

This committee hopes that the relative value schedule will be adopted by the House of Delegates at their 1958 meeting. If adopted, the schedule will be submitted to the various specialty groups for changes they wish to make to meet the conditions in this state. After this has been accomplished, the Medical Economics Committee will again meet to determine nonspecialty procedures and to adopt the entire schedule as revised to meet this state's requirements. A relative value fee schedule then will be sent to each doctor in the state. I request that a budget for the printing and mailing of these schedules be considered.

Conversion factors for governmental schedules were discussed by your committee and follow:

Indian Bureau fee schedule and Welfare schedule. These schedules were discussed together, since the committee thought that the 2 fee schedules were quite comparable. The conversion factors decided upon were as follows: surgery—2.85, medical services—2.67, pathology—2.25, and radiology—3.75.

Dr. Foster moved that the North Dakota State Medical Association negotiate in the future with the State Welfare Board and the Indian Bureau, using the above listed conversion factors and not lowering these factors. Motion was seconded by Dr. Richardson and carried.

Workmen's Compensation fee schedule. Dr. Mahoney moved that the North Dakota State Medical Association negotiate with the Workmen's Compensation Bureau and not go below the average fee schedule conversion factors. The conversion factors are to be as follows: surgery—4.28, medical services—4.00, pathology—3.00, and radiology—5.00. Motion was seconded by Dr. Borland and carried.

Vocational Rehabilitation fee schedule. Dr. Foster moved that the North Dakota State Medical Association negotiate in this area using the average fee schedule conversion factors (same as Workmen's Compensation schedule) as a basis. Motion was seconded by Dr. Mahoney and carried.

Crippled Children Services fee schedule. Dr. Peters moved that the House of Delegates go on record stating that all fee schedules involving members of the North Dakota State Medical Association be approved by the association and that no changes be made in these schedules without mutual consent of the parties involved. Motion was seconded by Dr. Borland and carried.

Dr. E. T. Keller was asked to comment on the unapproved portions of the C.C.S. schedule at the next meeting of the Special Advisory Committee to Crippled Children Services.

Medicare. Dr. Peters stated that representatives of the North Dakota State Medical Association were to be called in to Washington, D.C., in January 1958 for the purpose of renegotiating our Medicare contract with the Department of the Army. Dr. Peters also mentioned

that there were a few changes to be asked for in the fee schedule.

Dr. Keith Foster moved that the Medical Economics Committee commend the negotiating team, Dr. Peters and Mr. Limond, of 1956 for its efforts in securing a fair and reasonable contract and that the same basis of negotiation be used in 1958 as was used in 1956. Motion was seconded by Dr. Borland and carried.

North Dakota High School League fee schedule. The Medical Economics Committee recommend that efforts be made to inform the North Dakota High School Activities Association that each superintendent of schools should stress the true aspects of this plan and also state that the group accident benefit fund is not one of full coverage.

This chairman feels that this committee has initiated an important and necessary advance by establishing a relative value fee schedule, but much more work needs to be transacted by the committee to complete the schedule as dictated by this state's needs. This shall be done after adoption by the House of Delegates.

E. T. KELLER, M.D., Chairman

Committee on Prepayment Medical Care

This committee did not hold a meeting this past year. Many of its members have also been members of the Medical Economics Committee, which has been quite active during the past years. A survey by mail was made of the members of this committee of all topics it was felt well to discuss, and we found that in most instances these subjects had already been covered by the Medical Economics Committee. This duplication of effort by the Medical Economics Committee and the Prepaid Medical Committee does not seem justified in view of the fact that most of the work eventually has to be reviewed and passed upon by the Medical Economics Committee. Our present prepaid medical plans in North Dakota, such as Blue Shield and Blue Cross, are functioning well with very close liaison with the state medical association. The original purpose of the Prepaid Medical Committee was to work with and help develop Blue Shield and Blue Cross in this state. This having been accomplished, it is now felt that there is too much overlapping of the functions of the Medical Economics and Prepaid Medical Plan Committees.

Therefore, it was recommended to the council at their meeting in Fargo on December 14, 1957, that the Prepaid Medical Committee be abolished and that such work as might fall to this committee be handled by the Medical Economics group. I believe the new Constitution and Bylaws will also indicate that this committee has been abolished and made a part of the Medical Economics Committee.

In January, 1958, Dr. R. W. Rodgers, president of the North Dakota State Medical Association; Mr. Lyle Limond, executive secretary; and I comprised a committee that met with the Department of the Army in Washington, D.C., to renegotiate the Medicare contracts. Once again, we have obtained a maximum fee schedule which, I believe, will be fair to our entire membership and which should function well under the plan that has been in effect for the past several months. As you may recall, at the time this contract was first put into effect in December 1956, it was voted by the council not to publish this fee schedule. At the House of Delegates meeting in May 1957, the philosophy of this program was discussed and the action of the council in determining that this fee schedule should not be published was agreed upon and endorsed by the House of Delegates without a dis-

senting vote. During the intervening months, claims have been processed through the executive secretary's office and forwarded to the fiscal agent, the Wisconsin State Medical Society. This program has run smoothly with a minimum amount of discontent. Each physician has submitted his usual, customary, reasonable fee for his services, which, in effect, is the fee schedule as far as he is concerned. The Washington office of Medicare has been very happy with the way the program has been developed and run in North Dakota. Its experience with our maximum schedule, without our fee schedule being published, has been much more successful than in those 40-odd states and territories in which a schedule has been published. The Arbitration Committee, appointed by the state president of the association to go over any difficulties arising from this plan, met once in Bismarck during 1957. This is an indication, I believe, of the minimum amount of difficulty that we have encountered. In many states, such committees have been meeting monthly and, occasionally, even on a semimonthly basis.

During 1958 we anticipate that this program will become enlarged due to increased military personnel in the cities of Minot and Grand Forks. We also have reason to believe that these programs are being carefully scrutinized and watched by various agencies in governmental circles in Washington. We continue to feel that if the philosophy of our present program can be continued and reasonably and fairly developed as it has in the past year and a half, that other programs in the future may preserve the practice of medicine in this state along the lines that we have enjoyed in the past.

C. H. PETERS, M.D., Chairman

Committee on Veterans Medical Service

There has been no meeting of the Veterans Medical Service Committee during the past fiscal year. No matters have been reported to this committee for their consideration.

A. C. FORTNEY, M.D., Chairman

Committee on Rural Health

Our Committee held no formal meeting this past year. It is hoped that plans in the mind of the present chairman will jell so that this committee will become active in projects again.

M. S. JACOBSON, M.D., Chairman

NEW BUSINESS

Secretary Boerth read a letter addressed to Dr. Dodds from Dr. W. A. Wright, delegate to the A.M.A., which stated that he would be unable to attend the House of Delegates session as he was called to a meeting of a committee of the A.M.A. of which he is a member. Speaker Dodds acknowledged the letter with a comment of regret.

Speaker Dodds next introduced Mr. Hohlmeyer of the Union Central Life Insurance Company, who spoke as follows:

"Briefly, the type of coverage placed in force in your association is group term insurance. The amount of coverage is \$20,000 for those under age 50; \$15,000 for those of ages 50 to 59 inclusive; \$10,000 for those of ages 60 to 64; and \$6,500 for ages beyond 64. It is available without any evidence of insurability; the cost is roughly \$.50 on the dollar as it gives you the opportunity through mass buying to secure coverage at a cheaper rate. It has no cash value. Premiums are on a semiannual basis.

"This is a participating policy. Like all group insurance, what you buy is on a cost plus basis. The majority of the members of this group policy in the state have used their dividends to reduce premiums."

Dr. Nugent asked Mr. Hohlmeyer if there was any provision whereby the individual member will be guaranteed renewal. Mr. Hohlmeyer replied as follows:

"On the question of renewal, the master policy contains a provision that it can be canceled at the option of the company or the policyholder. The only reason a group policy of this type would be canceled would be because the number of participants were lowered; for instance, if there were only 75 to 80 lives insured, we would wonder about continuing this policy. The individual participant has a right to convert to permanent insurance while the policy is in force. We will continue this coverage without any question with 150 lives insured at the end of the year. That is our minimum objective.

"We would rather have you people follow the rules regarding the semiannual premium. You do have thirty days grace on this payment. If you pay an annual premium, it involves a great deal more bookkeeping for our office.

"I do not have the exact figures regarding the average group of the participating physicians so far but believe that in your group, approximately two-thirds to three-fourths are for \$20,000. One thing I could add is that this insurance is one piece of property you own which can bypass the estate tax. This policy can be so assigned to either your wife or children that it will not be a part of your estate, regardless of the fact that you are paying the premiums. In an ordinary life policy, you have cash values and you are, therefore, making a gift of that policy which will be subject to a gift tax. However, in this policy, there is no cash value and that is why the estate tax can be avoided.

"The enrollment on this policy will be open for the balance of the first contract year, that is until February 1959. New members of your association can come in at any time within the first six months of their membership in this association. After that, they can come in but must furnish evidence of insurability."

Speaker Dodds thanked Mr. Hohlmeyer. He then commented that the House was honored by the presence of the president, Dr. Rodgers, and welcomed him, asking if he cared to make any statement to the delegates at this time. Dr. Rodgers declined, saying only that he was happy to be present.

Speaker Dodds was asked to advise the delegates regarding the interim session of the A.M.A. in Minneapolis on December 2 to 5 of this year. As far as the meeting in Minneapolis is concerned, all of the members of the House should try to make an effort to be there. No doubt some of the members will be called upon to help out in the promotion of our cause.

Dr. V. G. Borland, councillor of the First District, was next called upon to give a brief explanation of a matter which had come before the council. He spoke as follows:

"This is in reference to the proposed group insurance for a malpractice plan that the council has considered. The proposal was placed in such a way that money could be saved on premiums. At this time, a survey will be conducted to see whether you want to consider this plan. If you are interested, the survey will be just a matter of answering a few questions to acquire some information. No further action will be taken until the council meets on this again after this survey."

The next order of business was the announcement of

the Nominating Committee. Dr. Boerth, secretary, announced that Dr. Rodgers, our president, had appointed Drs. Ted Keller, chairman, and A. K. Johnson and F. A. DeCesare to the Nominating Committee.

Dr. Gillam next presented the following resolution to the Committee on Resolutions for their consideration:

RESOLUTION

Whereas, a large number of physicians in North Dakota are represented much of the time in their public relations by lay persons acting as business managers, and

Whereas, these business managers have the best interest of their physician associates in mind, and

Whereas, these business managers might better be indoctrinated in and informed of the principles and procedures of medical legislation,

Be it resolved that any physician or group of physicians may recommend through its district medical society that such lay business managers are responsible and should have the opportunity to be considered "observers" at state medical association deliberations, and

Be it further resolved that if district approval is accomplished, the credentials committee shall be authorized to accept these individuals as "observers." An "observer" shall be a lay person so recommended who shall be seated in an area designated for "observers" and who cannot receive chair recognition or voting privileges. Accredited "observers" should be listed in the Handbook and receive copies prior to the meeting.

This resolution was referred to Dr. Pederson's Committee on Resolutions.

Dr. Nugent next presented a resolution as follows:

RESOLUTION

Whereas, the Committee on Medical Economics has adopted a relative value schedule based upon the California Medical Association's relative value schedule, and

Whereas, the Committee on Medical Economics has submitted the schedule to the various specialty groups for changes they wish to make to meet the conditions in this state, and

Whereas, the Committee on Medical Economics is asking that the relative value schedule be adopted by the House of Delegates at their 1958 meeting,

Therefore, be it resolved that the council of the North Dakota Academy of Ophthalmology and Otolaryngology recommend to the Committee on Medical Economics and to the House of Delegates of the North Dakota Medical Association that the California Medical Association Relative Value Schedule as it pertains to the specialties of ophthalmology and otolaryngology be adopted with the following changes:

Item No.	Procedure	Present value	Suggested change
5435	Refraction without cycloplegia	2.5	3.0
5436	Refraction with cycloplegia	3.5	3.0
5501	Sclerectomy for glaucoma with scissors, punch, or trephine	80.0	50.0
5616	Removal of dislocated lens	100.0	75.0
5641	Myotomy, tenotomy, recession, resection, advancement of, shortening of ocular muscles for strabismus—one or more stages, unilateral	50.0	50.0
5642	Bilateral	60.0	60.0
(It is noted that there is no change in the above items, but that they are to be interpreted as applying to any initial procedure, whether planned for one stage or multiple stages.)			
5643	One muscle, initial	30.0	Delete the item entirely
5646	Subsequent muscles	20.0	30.0

Dr. Dodds, speaker, commented that the chair would divert from the usual practice and that he would refer this resolution to Dr. Baumgartner's committee to consider the report of the Committee on Medical Economics.

Dr. E. G. Vinje next presented a resolution, stating that although he was a delegate from the Sixth District Medical Society, he assumed sole responsibility for presenting the resolution.

RESOLUTION

Whereas, North Dakota is the only state in the United States which does not have a doctor of medicine as state health officer, and

Whereas, the salaries of state health officers in these 48 states averages \$12,500 per year,

Therefore, be it resolved that the North Dakota State Medical Society recommend to the legislative research committee that they introduce a bill at the 1959 legislative session appropriating an amount of \$12,500 per year instead of the present \$9,960 and that a doctor of medicine be appointed state health officer at the earliest possible date.

This resolution was referred to the Committee on Resolutions for consideration.

At this time, the chair presented Mrs. J. D. Cardy, president of the Woman's Auxiliary, who presented her report.

REPORT OF THE PRESIDENT OF THE WOMAN'S AUXILIARY

It is indeed an honor and a privilege to appear here and present the accomplishments of our state auxiliary. I bring you greetings from physicians' wives in every corner of our state, wives who are dedicated to the medical profession and the ideals for which it stands.

During the past year, in accordance with the policy of our national organization, the presidents of our 10 component districts and I have stressed 4 topics: legislation, *Today's Health*, A.M.E.F., and a closer relationship with our district and state societies. I will discuss these activities in more detail.

In the field of legislation, we presented to our members various bills under consideration in Washington. We have been particularly concerned with the Forand bill and the effect its passage would have on the practice of medicine as we know it today. My visits to the district auxiliaries afforded the opportunity to point out the dangers of this bill, as well as the damage caused in the last few years by sneak bills which have expanded the provisions of the Social Security Act and jeopardized the practice of free medicine.

To further increase the knowledge and interest of our members in matters of health legislation, two articles dealing with the subject were published in our state paper, *News, Views, and Cues*.

Our "key women" in legislation attended both the North Central Medical Conference at Minneapolis last November and the special legislation committee meeting at Bismarck in March. At this meeting, plans were made for combating the Forand bill.

In this area of congressional activity so vital to all of us, our members are well informed and we stand ready to give you our assistance.

Concerning *Today's Health*, we emphasize the importance of placing in the hands of the public a magazine in which the articles on medicine are written by experts in the field. We have used posters, letters, and slides for special projects to promote sales of this publication. I believe it would be to the interest of all of us to encourage a wider circulation and reader acceptance of *Today's Health*.

The A.M.E.F. has received much of our attention and its founding, growth and purpose were outlined in my talks. A "Daily News" from the A.M.A. convention last June was used with effect. This particular copy showed the presentation of a huge contribution to the A.M.E.F. from the Illinois State Medical Association and helped to impress our members with the tremendous importance of the foundation. This year, by the use of memorial cards and by direct contributions, we will turn over more than \$200 to the A.M.E.F.

In 1950, when we considered establishing our Sophomore Medical Student Loan Fund, we looked to the state medical association for authority, guidance, and assistance. This we received in full measure, and, since then, I am sure you have become more and more cog-

nizant of our sincere desire to be of assistance to you. I wish to thank your officers, your committee chairmen, and your executive secretary for the invaluable assistance they have given the state and district auxiliaries.

Also, we wish to extend our thanks to the state medical association for its support in the American Association of Physicians and Surgeons essay contest. Your cash awards to the state winners encouraged 6 of our districts to seek the permission of their local societies to promote this project. It is felt that this activity will do much to better our public relations.

At its fall meeting, our Board voted to support the North Dakota Cancer Society and its Cancer Caravan. In these and other activities too numerous to mention, you will find that our members are constantly active in the field of public relations.

Safety is a relatively new division in the program of our national auxiliary, and our participation at state and district levels has been rather limited. In April, I represented our organization at President Eisenhower's Conference on Traffic Safety. This was a very profitable experience and one I shall long remember. Throughout our entire country, traffic safety has become a most vital problem. I am certain our group can play an important part in this program and consideration of this topic will be included in the proceedings of this convention.

Our Medical Student Loan Fund is still our major project. Early this year, we received a wonderful letter from President George W. Starcher of the University. Dr. Starcher praised and thanked our members for their wonderful contribution to medical education in North Dakota. He also asked our continued support and pointed out the ever increasing need for a loan fund such as ours. It was feared that the passage of a bill providing loans from the Medical Center Fund would tarnish our pioneer project. Such has not proved to be the case. During the past year, so many applications were made for our maximum loan of \$1,000 that they could not be met. Individual loans of only \$500 could be granted.

In districts where our members are few in number, individual contributions are made to the fund. In our larger districts, money is raised by projects, such as luncheons, rummage sales, style shows, dinner dances, used book sales, and ticket sales on floral center pieces used at district auxiliary dinner meetings.

To date over \$14,000 has been raised and assistance has been given to 25 medical students. The sum of \$2,604.42 is on hand for loans this year.

Gentlemen, as you know, in your day, few medical students were married and the need for financial support was not so great. However, since it is a trend of the times we feel that we are the logical group to which our young doctors of tomorrow should make their appeal for assistance. I should like to ask you to encourage your wives to increase their already wonderful endeavors in this field.

Now, I should like to bring to your attention the organization and progress of a young group important to all of us. In 1952, our state president and representatives of the Grand Forks District Auxiliary met the medical students' wives of our University. On this occasion, the Medical Student Wives Club was formed. Since its inception, this group has shown enthusiasm and interest and has a perfect record of membership. Close contact between the club and our Grand Forks Auxiliary is being maintained. Auxiliary members open their homes for one of the student wives' meetings each month. Also, an auxiliary member is appointed as advisor to them. Each year, usually during the visit of our state president, the

girls are guests at a Grand Forks Auxiliary dinner meeting. This group, in turn, entertains the auxiliary at a coffee party. Furthermore, they have chosen to submit an annual report.

This very day, the Medical Student Wives Club of North Dakota will be among the first in the nation to receive its charter as an auxiliary to the Student American Medical Association. This presentation is taking place in Chicago at the first convention of the auxiliary to the Student American Medical Association.

We are deeply grateful to our publicity chairman and editor, since, through their efforts, 4 outstanding editions of *News, Views and Cues* were sent to us this year. Articles contributed by many of our state chairmen, President Starcher's letter, profile sketches, and news of all our districts were in each issue. They also prepared and sent news releases to all our state newspapers.

While I believe the topics I have just discussed are of greatest interest and importance to our auxiliary and to you, there are several other activities that are of great significance and worth mention. In almost all our districts, at least 1 program of the year has been devoted to Mental Health, and the Committee on Mental Health has been able to distribute valuable information to our members. Programs of civil defense play a role in at least 5 of our districts, and we can expect further expansion of this activity with the organization of more civil defense units. Our recruitment program has continued much the same as last year and includes all allied medical careers.

The Women's Auxiliary to the North Dakota State Medical Association is not a social group. It is a community service group, and its desire is to continue and better its work. We consider it an honor to work with you and for you. Please call on your auxiliary.

Speaker Dodds thanked Mrs. Cardy and called for any further new business.

Dr. C. M. Lund at this time presented the following resolution:

RESOLUTION

Whereas, a program of establishing cancer registries in North Dakota hospitals has been approved by staff members of most hospitals, and

Whereas, cancer registries have now been established in 15 hospitals and a sound program of establishing many more in the future appears to be certain, and

Whereas, cancer registries are required by the American College of Surgeons for hospital accreditation and evidently will be a requirement of most hospital associations for accreditation,

Now, therefore, be it resolved that the North Dakota Medical Association recommend the establishment of a central cancer registry to be established and maintained at no expense to the North Dakota State Medical Association and be located and maintained by the Bureau of Vital Statistics of the United States Public Health in Bismarck.

This resolution was referred to the Committee on Resolutions.

Adjournment

There being no further new business to come before the House, it was moved and seconded that the first session of the House of Delegates adjourn to reconvene at 2:00 P.M., Sunday, May 4, 1958. Time of adjournment was 5:30 P.M.

PROCEEDINGS OF THE HOUSE OF DELEGATES of the North Dakota State Medical Association Seventy-First Annual Meeting, Second Session Minot, North Dakota, May 4, 1958

The second session of the House of Delegates was called to order by Speaker Dodds at 2:00 P.M., May 4, 1958, at the Clarence Parker Hotel, Minot. The chair-

man of the Credentials Committee, Dr. John Gillam, reported that there was a quorum present. Secretary Boerth called the roll and the following delegates responded:

Drs. A. C. Burt, Fargo; F. M. Melton, Fargo; W. L. Macaulay, Fargo; F. A. DeCesare, Fargo; John S. Gillam, Fargo; E. J. Beithon, Wahpeton; D. G. Jaehning, Wahpeton; R. M. Fawcett Devils Lake; J. H. Mahoney, alternate; Devils Lake; Robert Painter, Grand Forks; G. L. Countryman, Grafton; R. E. Mahowald, alternate, Grand Forks; W. P. Teevens, Grafton; Welde Frey, alternate, Drayton; V. J. Fischer, Minot; A. R. Sorenson, Minot; F. D. Naegeli, Minot; A. F. Hammargren, Harvey; C. J. Klein, alternate, Valley City; R. W. Henderson, Bismarck; Milton Nugent, Bismarck; R. B. Tudor, Bismarck; Carl Baumgartner, Bismarck; Edmund Vinje, Hazen; T. E. Pederson, Jamestown; John van der Linde, Jamestown; A. K. Johnson, Williston; Keith Foster, Dickinson; and R. W. McLean, Hillsboro.

There were 29 delegates present. The following also attended the meeting:

Drs. R. H. Waldschmidt, L. W. Larson, C. M. Lund, K. G. Vanderson, J. C. Fawcett, C. J. Glaspel, C. H. Peters, O. A. Sedlak, R. W. Rodgers, Amos Gilsdorf, G. W. Toomey, V. G. Borland, N. A. Youngs, D. J. Halliday, R. D. Nierling, John Craven, and Mr. Lyle A. Limond.

The first order of business was a motion to dispense with the reading of the minutes of the first session. Motion was seconded and passed.

The Chair, at this time, digressed from the usual order of business to yield the floor to Dr. H. M. Berg, who presented the following information concerning the status of the State Tuberculosis Sanatorium.

"As the council felt this was too big a matter for them to decide, a committee was appointed consisting of Dr. G. A. Dodds, Dr. Joseph Sorkness, and myself. We went over the letter from Herman H. Joos, chairman of the Board of Administration, regarding the situation of the North Dakota Tuberculosis Sanatorium and came to the following conclusions for the House of Delegates:

"The committee recommends the following:

"1. Every effort be made to keep the North Dakota Tuberculosis Sanatorium in operation.

"2. A vigorous attempt be made to find a competent replacement for Dr. Loeb.

"3. An advisory committee of 3 members of the North Dakota State Medical Association be established to advise the superintendent of San Haven and/or the North Dakota State Board of Administration on the medical administration of the tuberculosis sanatorium. The members of this committee should be selected by the president of the North Dakota State Medical Association and their names submitted to the chairman of the Board of Administration for appointment. This committee would meet at least every three months and at other times as requested by the superintendent, the chairman of the Board of Administration, or the advisory committee.

"4. That the names for this committee be submitted immediately, since the superintendent of the sanatorium has resigned effective July 1, 1958, and this committee should assist the Board of Administration in obtaining a replacement."

G. A. DODDS, M.D.

JOSEPH SORKNESS, M.D.

H. M. BERG, M.D.

This presentation was followed by a request from Speaker Dodds for comments from the delegates. An informal discussion followed, resulting in a motion made by Dr. Mahowald and seconded by Dr. Tudor that the recommendations from the committee be approved. Motion passed.

REPORTS OF REFERENCE COMMITTEES

Reference Committee to Consider the Reports of the President, Secretary, Executive Secretary, and Treasurer

Dr. J. H. Mahoney, chairman, presented the following

reports and their discussions, which were adopted section by section and as a whole:

1. *Report of the President.* The reference committee concurs with the president that the general membership is too apathetic and has too little knowledge of the affairs of our state association. All district societies should receive reports of the transactions at the annual meeting, and we delegates have the responsibility of infusing the enthusiasm of our state officers to the district membership.

We are pleased to note the president's reference to the Liaison Committee in respect to Blue Shield. The association is now officially represented on the Board of Directors of Blue Shield. We believe that this representation will insure proper division of coverage of these plans. This committee does not believe that the House of Delegates is the proper vehicle to approve Blue Shield schedules, except as noted previously.

We recommend the innovation for selecting committee members as introduced this past year by Dr. Rodgers.

We concur with the president that the defeat of the Forand bill is of utmost importance.

The president has emphasized our duty in the care of the tubercular patient. As long as tubercular patients live, the epidemic potential is present.

The reference committee concurs with the president's recommendation that the elective officers should be given more responsibility, and perhaps their duties should be definitely outlined. We believe the Committee on Constitution and Bylaws should be directed to evaluate the duties of state officers so that the president-elect and the vice-presidents could be utilized in a more efficient manner.

This committee feels that Dr. Rodgers has exemplified the leadership which medicine so desperately needs. He should be commended for the initiative he has demonstrated. His interests have been broad, yet, no detail has escaped his attention.

This portion of the report was adopted.

2. *Report of the Secretary.* The reference committee reviewed the report of the secretary, Dr. E. H. Boerth, and notes that he re-emphasizes the importance of collecting the dues and forwarding them to the state office not later than March 1 of the current year. We wish to call the House of Delegates' attention to his report, which shows only 313 paid-up members as of April 15, 1958, in comparison to 395 paid memberships in 1957. We urge each district to increase its efforts to submit the dues promptly.

This portion of the report was adopted.

3. *Report of the Executive Secretary.* The reference committee believes, as does the executive secretary, Mr. Limond, that committees should function actively. The association has felt there is a need for these committees and has created them. Developing affirmative constructive programs can be stimulating to the committees as well as the association.

Next year is legislative year. We recommend that the district societies have active legislative committees ready to function and that they personally know their local legislators.

We commend our executive secretary in performing his functions and duties.

This portion of the report was adopted.

4. *Report of the Treasurer.* The reference committee studied the report of the treasurer, Dr. E. J. Larson, and we wish to commend him for his financial astuteness and management of the association's funds.

This portion of the report was adopted.

The motion was made by Dr. Mahoney and seconded

by Dr. Beithon that the report be adopted as a whole. Motion was carried.

J. H. MAHONEY, M.D., Chairman
FRED ERENFELD, M.D. (not present)
A. K. JOHNSON, M. D.
MILTON NUGENT, M.D.
WELDE FREY, M.D.

Reference Committee to Consider the Reports of the Council, Councillors, and Special Committees

Dr. R. M. Fawcett, chairman, presented the following reports and their discussions, which were adopted section by section and as a whole.

1. *Report of the Chairman of the Council.* Your reference committee reviewed the report of the chairman of the council. We recommend that our delegate to the 1961 annual meeting of the A.M.A. issue an invitation to the then selected president-elect to address our Diamond Jubilee Meeting in 1962.

Your reference committee noted that the council, through its chairman, recommended to the State Welfare Board that a joint meeting be held between the State Welfare Board Committee on Crippled Children and the State Association Committee on Crippled Children. There is no indication that such a meeting has been held. Your committee recommends that a report relative to this be presented on the floor of the House of Delegates. If no such meeting was held, we recommend that it be held during the ensuing year and the results of the meeting be reported to the doctors of the state.

This portion of the report was adopted.

Dr. E. T. Keller next spoke briefly regarding the joint meeting between the State Welfare Board Committee on Crippled Children and the State Association Committee on Crippled Children. "I was your appointed delegate to that committee in liaison with the Crippled Children's program. We went over all the items separately which we felt were not items belonging to the long-term hardship cases. Those 2 items were intussusception and congenital pyloric stenosis. I understand that later they crossed out other items. I think it should be brought up before the House of Delegates that they should take a stand on either adding or keeping items. Whether this is a trend to socialized medicine or not, I am not sure; but I do think we should take a stand on it. I believe this calls for discussions and deliberations.

2. *Reports of the Councillors.* The reference committee reviewed the reports of the councillors. Although some deficiencies were present, marked improvement in the reports of the councillors was noted. Our committee again urges the executive secretary's office to advise each councillor of the suggested acceptable form for submitting such reports, as was pronounced by the House of Delegates in May 1957.

This portion of the report was adopted.

3. *Report of the Committee on Maternal and Child Welfare.* With reference to the paragraph: "We recommend that the local county medical societies have periodic polio injections every two years"—the reference committee recommends that this portion of the report be deleted for reasons of ambiguity.

With reference to paragraph 8, outlining minimal requirements for filing adoption papers, the reference committee wishes to amend the first sentence to read: "If sterility is the basis for adoption, the following minimal requirements for the filing of adoption papers are:"

This portion of the report, with amendments, was adopted.

4. *Reports of the Committees on Cancer, Nursing Education, Mental Health, Diabetes, Geriatrics and Re-*

habilitation, Emergency Medical Service, A.M.E.F., School Health, and the member of the Governor's Health Planning Committee.

There being no controversial subjects in these reports, this portion of the report was adopted after their review by the committee.

5. *Report of the Committee on Crippled Children.* The reference committee reviewed the report of the Committee on Crippled Children and recommends that this committee meet with the State Welfare Board Committee on Crippled Children each year to impress on that board the continuing interest of the association in the policies of the Crippled Children's program.

This portion of the report was adopted.

6. *Report of the Committee on Foreign Trained Physicians.* The reference committee reviewed the very complete report of the Committee on Foreign Trained Physicians and wishes to commend its chairman, Dr. C. J. Glaspel, on the excellence of his report. This committee recommends that the present standards and statutes of the Medical Practice Act of the 1957 legislature be maintained.

This portion of the report was adopted.

7. *Report of the Committee on Constitution and By-laws.* The reference committee reviewed the report of the Committee on Constitution and Bylaws and concurs in its chairman's recommendation that a special committee on revision of the Constitution and Bylaws need not be appointed annually until such a need becomes apparent. It further commends the committee and its chairman, Dr. Robert Radl, for their excellent work in revising the Constitution and Bylaws.

Speaker Dodds added the following remarks to this report: "You will remember that in the reference committee's report to consider the report of the president, it was recommended that the Committee on Constitution and Bylaws should be directed to evaluate the duties of state officers, therefore admitting to a need for this committee."

This portion of the report was adopted.

Dr. R. M. Fawcett moved the adoption of the report as a whole, seconded by Dr. Tudor, and carried.

R. M. FAWCETT, M.D., Chairman
W. L. MACAULAY, M.D.
ROBERT GILLILAND, M.D.
EDMUND VINJE, M.D.
V. J. FISCHER, M.D.
W. P. TEEVENS, M.D.

Reference Committee to Consider the Reports of the Delegate to the A.M.A., Medical Center Advisory Council, and the Committee on Medical Education

Dr. Keith Foster, chairman of this committee, presented the following reports and their discussions, which were adopted section by section and as a whole.

1. *Report of the Committee on Medical Education.* The reference committee commends the report of Dr. H. M. Berg and his committee and wishes to emphasize the importance of short courses to state members of the American Academy of General Practice. Also, it might be well that physicians in the state consider splitting their donations to A.M.E.F. to include a proportion to North Dakota and thus increase the amount received by our University per year. We strongly recommend that a physician should, if possible, be on the State Board of Higher Education.

An amended report of the Committee on Medical Education was presented at this time, and follows: "We suggest that the Committee on Legislation attempt to have the legislature pass the following amendment to

Senate bill No. 181, which deals with loans to third and fourth year medical students.

"Any doctor who has borrowed funds under this bill and who returns to the state for his internship and residency or accepts a position in a state institution be allowed one-fifth credit for each year so spent on the unpaid balance of the loan and one-fifth of the accrued interest thereon."

H. M. BERG, M.D., Chairman
Committee on Medical Education

This portion of the report, with the inclusion of the amended report, was adopted.

2. *Report of the representative to the Medical Center Advisory Council.* The report of the representative was reviewed, and the reference committee wishes to re-emphasize to the House of Delegates and, in turn, to the association that the physicians of the state should show more interest as individuals in the problems and policies of the school and procurement of well qualified students for North Dakota's School of Medicine.

This portion of the report was adopted.

3. *Report of the Delegate to the A.M.A.* The reference committee wishes to compliment Dr. Wright on his report as the delegate to the A.M.A. as an excellent summary of the more important actions of the A.M.A. within the past year. Also, it is suggested that this report in the Handbook be read by the delegates to the individual district societies to further enlighten individual members.

This portion of the report was adopted.

Dr. Foster moved the adoption of the report as a whole. Motion was seconded by Dr. Pederson and carried.

KEITH FOSTER, M.D., Chairman
R. B. TUDOR, M.D.
R. W. McLEAN, M.D.
R. E. MAHOWALD, M.D.
J. S. GILLAM, M.D.

Reference Committee to Consider the Reports of the Standing Committees

Dr. Hammargren, chairman, presented the following reports and their discussions, which were adopted section by section and as a whole.

1. *Report of the Committee on Necrology and Medical History.* It was with a feeling of sadness and sorrow that the reference committee reviewed the report of this committee. As it must to all men, death has come during the past year to 7 of our esteemed and beloved brother physicians. They are, namely: Dr. W. W. Wood, Jamestown; Dr. H. M. Waldren, Jr., Drayton; Dr. A. E. Donker, Carrington; Dr. W. H. Gilsdorf, Valley City; Dr. K. M. Murray, Scranton; Dr. J. G. Lamont, Grafton; and Dr. E. S. O'Hare, Esmond.

These doctors have all been a credit to our profession, and some have been very active in this association and have done a great deal to promote its best interests. Dr. Hammargren asked the delegates to manifest their reverence and respect by standing in a moment of silence.

Moment of silence adopted this portion of the report.

2. *Report of the Committee on Legislation.* The reference committee noted that the Committee on Legislation had not had any special meeting as of March 18, 1958, since there was no legislative session in North Dakota this year. The chairman of the Legislation Committee commented on the Forand bill especially, warning that if passed this would be a rather rapid step toward full socialization. He also commented on the Jenkins-Keogh bill, and we wish to read this paragraph to the House of Delegates. "Another bill that is to again be considered within this next Congress (the Jenkins-Keogh

bill), is a bill granting the privilege to the physician of setting aside a certain percentage of his earnings for retirement. This is done in view of the fact that the physician is not included in social security. The physician has not been included in social security because of his desire to be left on the outside, and I am in accord with such decision. It is the impression and opinion of your chairman that, should we accept any privileges including social security, we would simply be advancing ourselves one step closer to socialized medicine and condoning socialized medicine."

This portion of the report was adopted.

3. *Report of the Committee on Public Relations.* The reference committee reviewed the report of this committee and wishes to commend the committee for their activity in the field of public relations.

This portion of the report was adopted.

4. *Report of the Committee on Official Publication.* The reference committee notes that the Committee on Official Publication reports that the contract with THE JOURNAL-LANCET has two more years to run.

This portion of the report was adopted.

5. *Report of the Committee on Public Health.* The reference committee reviewed the report of the Committee on Public Health and notes that they held a meeting on September 22, 1957. The purpose of this meeting was to discuss the Asian flu problem, and they recommended the vaccine.

The committee also noted that only 55 per cent of the population of North Dakota had received the first polio injection as of February 28, 1958; only 48.8 per cent had received the second injection; and 32.6 per cent had had the third injection.

The venereal disease incidence of the state was also noted.

This portion of the report was adopted.

Dr. Hammargren, chairman of the committee, moved that the report as a whole be adopted. Motion was seconded by Dr. Sorenson and carried.

A. F. HAMMARGREN, M.D., Chairman
A. R. SORENSON, M.D.
G. L. COUNTRYMAN, M.D.
E. J. BEITHON, M.D.
JOHN VAN DER LINDE, M.D.

Reference Committee to Consider the Reports of the Committee on Medical Economics, Committee on Prepayment Medical Care, Committee on Veterans Medical Service and Committee on Rural Health

Dr. Carl Baumgartner, chairman, presented the following reports and their discussions, which were adopted section by section and as a whole.

1. *Committee on Medical Economics.* The reference committee reviewed the report of the Committee on Medical Economics and is cognizant of the fact that the committee has been exceptionally active this past year in bringing to a head many problems that have confronted us in the past.

a. Through their efforts, the group plan of life insurance for members of the association has been made available at moderate premium rate savings without evidence of insurability.

b. In regard to welfare payments, the Committee on Medical Economics feels that the House of Delegates of the North Dakota State Medical Association should seriously consider urging the A.M.A. to make efforts to have Congress amend the present Social Security Act, which makes payment of physician services to the recipient instead of the physician—the amendment thus requiring direct payment to the physician for his services. It is

evident that many a recipient fails to use this added fund for the payment of the doctor.

Your reference committee concurs with the Committee on Medical Economics regarding vendor payments to the doctor rather than the recipient, and we recommend that our delegate to the A.M.A., Doctor Wright, so convey this recommendation to the House of Delegates of the A.M.A.

c. It is noted that the Committee on Medical Economics has endeavored to draw up a relative value fee schedule for the entire state from which other schedules, such as Workmen's Compensation, Welfare Board, and others, could be taken. Such an accomplishment is a stride forward toward setting up a fee schedule to these various component organizations acceptable to the physicians of this association. We feel also that it must be kept in mind that such a relative value schedule with its conversion factors should not become the property of the various agencies.

Your reference committee, however, feels that there is a rather wide variation between the conversion factors of Welfare Schedules and Workmen's Compensation Schedules. We, therefore, feel that the negotiating committee be given more flexible authority to change these conversion factors in keeping with the present day fee schedules as dictated by economic situations and relative to the various agencies with whom the negotiating committee confers. With this in mind, your reference committee feels that such a relative value fee schedule be adopted and that the House of Delegates go on record stating that all fee schedules involving members of the North Dakota State Medical Association be approved by the Association and that no changes be made in these schedules without mutual consent of the parties involved.

The reference committee recommends that the representatives of the specialty groups review the relative value schedule and recommend to the Committee on Medical Economics any changes they feel necessary. This should be done in the immediate future in order that the Committee on Medical Economics has this information and can negotiate a relative value schedule with the various agencies whose budget for the next two years will be established this fall.

This reference committee recommends that the contract which has been submitted in the Indian health area office should not be signed until the relative value schedule has been adopted and the contract negotiated on this basis.

This portion of the report was adopted.

In connection with the first part of this report in regard to vendor payments, Dr. Boerth next read a letter from the senior senator in Washington, D.C.

United States Senate
April 28, 1958

Dear Dr. Boerth:

Mr. Carlyle Onsrud has written to me concerning H.R. 11703,

bringing to my attention the fact that your organization is anxious to see that this legislation gets passed.

This is just a note to let you know that I am 100 per cent with you on this bill, and I will do everything I can to see that it gets early favorable action. I have already notified Congressman McCornack that I am supporting the bill, and I will do all I can to get the other senators along with me on this.

If there is any other way in which I may be of service to you down here, be sure to let me know. I am anxious to help whenever possible.

With just every good wish and kindest regards, I am,

Sincerely,

WILLIAM LANGER

This portion of the report was adopted.

2. *Committee on Prepayment Medical Care.* The reference committee is cognizant of the fact that the Committee on Prepayment Medical Care and the Committee on Medical Economics have overlapped in recent years and notes that the Committee on Prepayment Medical Care has been abolished in the new Constitution and Bylaws. In the past, this committee was set up to work with and aid the development of Blue Shield and Blue Cross. This committee's function is now defunct, since its purpose has been accomplished.

This reference committee notes that mention is made in the report of the Committee on Medical Economics regarding Medicare. It is noted that our representing committee fared well in Washington in maintaining our previous schedule and thus preserved the practice of medicine in this state along the lines that we have enjoyed in the past. Your reference committee, therefore, commends Dr. Rodgers, Dr. Peters, and Mr. Limond for their untiring and thoughtful efforts in negotiating with the Department of the Army in Washington in January of this year.

This report, in the future, will be included in the report of the Committee on Medical Economics.

This portion of the report was adopted.

3. *Committee on Rural Health.* Your reference committee notes that the Committee on Rural Health did not function in the past year, but it is our hope that all of us in our own way are cognizant of our own local needs in Rural Health and exploit them to the best of our individual ability.

This portion of the report was adopted.

4. *Committee on Veterans Medical Service.* Your reference committee notes that there was no need for the Committee on Veterans Medical Service to function this past year, since no problems have arisen.

This portion of the report was adopted.

Dr. Baumgartner moved that the report as a whole be adopted. Motion was seconded by Dr. Foster and carried.

CARL BAUMGARTNER, M.D., Chairman
ARTHUR C. BURT, M.D.
G. CHRISTIANSON, M.D.
FRANK MELTON, M.D.

(TO BE CONTINUED IN OCTOBER)

A History of Public Health, by GEORGE ROSEN, M.D., 1958. New York: M.D. Publications, Inc., 551 pages. \$5.75.

This book describes the development of public health, beginning in the Greco-Roman world and taking the reader through the Middle Ages (500 to 1500 A.D.), the eras of 1500 to 1750, 1750 to 1830, the Industrial and Sanitary Movement (1830 to 1875), and the bacteriological era and its aftermath. But, this book is something more; the author portrays to some extent the social, political, and economic problems in each of these periods and the influence which these problems have had upon our concept of the relationship between man and his environment and between the individual and services provided by government on an organized community basis. This book provides a wealth of information for the health worker interested in the broad field of public health or in a number of special fields of interest, for example, environmental sanitation, epidemiology, occupational health, statistics, public health education, public health nursing, nutrition, and maternal and child health. Included also are descriptions of the development of hospital care and of various efforts made to date to tackle the knotty problem of medical care of the people. To provide such a comprehensive treatment of such a varied field requires a broad background and knowledge which the author skillfully demonstrates.

The book is interesting and well written. The preface especially deserves a word of praise because it gives the reader a much needed perspective of the point from which we have come and of the place where we currently are.

This book is easily read and can be recommended for the public health worker, students, and the lay public.

HELEN M. WALLACE, M.D.

Psychobiology, by ADOLF MEYER, M.D., Late Henry Phipps professor of psychiatry, The Johns Hopkins University, Baltimore, Maryland, 1957. Springfield, Illinois: Charles C Thomas, 258 pages. \$6.50.

This book consists of three lectures given in April 1932 by Dr. Adolf Meyer for the Thomas William Salmon Memorial lectures at the New York Academy of Medicine. The publication of these lectures was



delayed twenty-five years, during which time many elaborations and revisions were made.

The lectures represent an effort on Dr. Meyer's part to bring his conception of man into a closer relationship with the other disciplines of science and medicine. He desired to work up to a balanced and socialized conception of medicine and life rather than a dogmatic one, to a consciousness of psychiatry in its truly medical sense and to let this work take a concrete form as an expression of investigation rather than philosophy.

In the first lecture, he seeks to affirm for science the naturalness and objectivity of man's life as a person. Because of his broad insight, he has been able to understand the nature and course of man's development. The reader catches glimpses of the effects and of the forces of adaptation in the history of man. The author attempts to show how the psychobiologic neurotic patient presents a picture of man and life which can satisfy our critical common sense.

In the second lecture, one is impressed with his dominant preoccupation with the symbolization. He obviously felt that an understanding of his dynamic conception of psychopathology depended on a thorough grasp of the mind as a symbolizing function. His presentation of pathology is fundamentally an issue of control.

In the third lecture on therapy, Dr. Meyer stresses the point that the fundamental responsibility of the physician is to change the patient. He believes that psychobiologically oriented psychiatry bases its treatment on the principle that the assets of the patient, understood by the physician, can be used to counteract the less healthy tendencies. There are no rules of the thumb. Treatment consists chiefly in defining one's own position with respect to the patient's story, defining the patient's position with respect to it, and working the most melioristic

approximation of these two viewpoints.

I feel this book would be most interesting and thought provoking to any practitioner of medicine, especially to those particularly interested in the behavior of man.

ROBERT W. CRANSTON, M.D.

The Dermatologist's Handbook, by ASHTON L. WELSH, M.D., edited by ARTHUR C. CURTIS, M.D., 1957. No. 293, American Lecture Series, monograph in Bannerstone Division of American Lectures in Dermatology. Springfield, Illinois: Charles C Thomas; Oxford: Blackwell Scientific Publications, Ltd.; Toronto: Ryerson Press, 427 pages. \$15.00.

This rather large volume is essentially a compilation of a considerable amount of data on a great number of pharmaceutical and biologic products which are used both internally and topically. The information has been obtained from the United States Pharmacopoeia, National Formulary, New and Nonofficial Remedies, and from the various manufacturers.

In the first portion of the book, various topical dermatologic preparations are listed, including proprietary agents as well as many prescriptions. These are all grouped according to therapeutic usefulness. A variety of mucous membrane medications are also included in this section. Brief mention is made of mechanical therapeutic measures, diagnostic tests, and allergens.

The next section deals with internal therapy and includes descriptive information, indications and contraindications, methods of administration, dosages, and reactions of a large number of biologic and pharmaceutical products.

The last section contains general and specific reference data, including tables of normal values, information on the removal of stains, prescription writing, and, finally, chapters on reactions to various therapeutic substances.

As the name implies, this book has presumably been prepared for use as a handbook by dermatologists. However, some of the information seems of doubtful value to most dermatologists and the omission of this material would enhance the value of the book. Nevertheless, it does contain a vast amount of pharmacologic data and should be useful as a reference book.

ELMER M. HILL, M.D.

The Apparent Relationship Between the Stein-Leventhal Syndrome and Endometrial Carcinoma

JOSEPH SORKNESS, M.D., JOHN A. SWENSON, M.D., and
ROBERT E. LUCY, M.D.

Jamestown, North Dakota

DURING THE PAST TWENTY YEARS, much has been written and discussed concerning the so-called Stein-Leventhal syndrome. Appearing in the literature throughout the world have been many reports of single cases¹⁻¹³ and several reports of series of varying lengths.¹⁴⁻¹⁹ However, not until recently has any emphasis been placed upon the apparent relationship existing between the Stein-Leventhal syndrome and endometrial carcinoma, which occurs as a late manifestation of this syndrome.

REVIEW OF LITERATURE

In 1935, Stein and Leventhal¹⁴ presented the first report of this new syndrome, consisting of menstrual irregularity, a history of sterility, hirsutism, and obesity; amenorrhea was usually noted and, occasionally, retarded breast development. They postulated that the polycystic ovarian alterations noted were related to an abnormal pituitary hormonal stimulation with the formation of capsular fibrosis of the ovaries, which acted as a direct barrier to ovulation. Bailey,¹⁵ in 1937, determined its cause to be a deficiency of pituitary stimulation resulting in secondary cessation of ovarian physiology; the arrest of fol-

licular maturation led to the polycystic ovarian condition and perhaps also to chronic cirrhosis of the peripheral tunic and central stroma. In a later report, Ingersoll and McDermott¹⁶ obtained normal values for the follicular stimulating hormone in 3 of 29 patients studied and theorized that the pituitary deficiency was in a luteinizing factor. Sommers and Wademan²⁰ contended that pituitary basophilism interfered with the production of follicle stimulating hormone. DuToit²¹ stated that the thickened ovarian capsule was secondary to the formation of cysts and was related to the absence or defective development of the thecal core. Still other investigators²²⁻²⁴ have ascribed the alterations in the ovary to circulatory changes in the ovary.

It is readily observed that, while there is much interest in this syndrome and much study has been done concerning its etiology and its physiology, agreement does not exist on these points.

A considerable degree of unanimity is found in the literature regarding the actual gross pathology involved, however. Gross ovarian changes consisting of enlargement, grey-white color, and a thick fibrous layer which covers a rim of immature follicles and overlies a fibrous central core containing no cysts are common findings.^{6,14,16,25-27} Other features of the syndrome do not occur uniformly in each patient. Hirsutism, retarded breast development, or

amenorrhea are not always present; in some cases, hypermenorrhea has been reported and, in still others, sterility apparently was not a problem. Most of the reports, however, indicate the presence of all or a majority of the usual signs of the syndrome.

Preferred therapy has apparently been fairly well established; most of the reports advocate the use of bilateral wedge resection of the ovaries, and this procedure apparently has proved to be successful. Van Wagenen and Morse²⁸ have shown by experiments that resection of one-third of the ovarian cortex does not deplete the ovarian function. Agreement as to why this procedure gives relief has not been reached. Novak and Reycraft²⁹ proposed that the success of the wedge resection is due to the reduction of target area in the ovaries, thus promoting a better pituitary ovarian hormonal balance; this view was also held by others.^{14,15} Hirsch³⁰ and Jacobsen³¹ both favor the theory that success of the wedge resection is due to the relief of ovarian pressure which improves the venous and arterial blood supplies of the follicles in the state of arrested maturation.

Not until recently has emphasis been placed on the relationship between the Stein-Leventhal syndrome and the endometrial carcinoma implied by the occurrence of the latter as a late manifestation of this syndrome. In 1951, Dockerty, Lovelady, and Foust¹⁷ presented a report in which they stated that almost 20 per cent of women less than 40 years of age with carcinoma of the uterus gave clinical evidence of the Stein-Leventhal syndrome. They reported 1,694 patients with carcinoma of the body of the uterus; of these patients, 36 were less than 40 years of age and 7 of these had the Stein-Leventhal syndrome. Of the 26 adenocarcinomas diagnosed, 13 were grade I. Later in the same year, Dockerty and Mussey³² emphasized that granulosa cell tumors of the ovary were carcinogenic with regard to the endometrium and reported an incidence of 16 cases which were associated with uterine malignancy.

The explanation of the association between the granulosa cell tumor and the ovary in the Stein-Leventhal syndrome was not clarified until 1957 when Jackson and Dockerty¹⁸ postulated that the hyperplastic theca interna of the ovaries in patients, through elaboration of excess estrogen or continual estrogenic stimulation of the endometrium, has the same effect as the granulosa cell tumor. This paper presented a report of 43 patients exhibiting the Stein-Leventhal syndrome seen at the Mayo Clinic from 1909 to 1954. Of these patients, 16 also had uterine car-

cinomas — 12 being adenocarcinomas and 8 adenocarcinomas grade I. The carcinomas were diffuse in 4 of the patients; circumscribed malignant adenomas were reported in all the rest. Age of patients ranged from 27 to 48 years, the majority of patients being in their late 30's and 40's. A history of abnormal bleeding was elicited in 14 of the 16 patients, and only 1 viable offspring had been delivered.

Sommers, Hertig, and Bengloff²⁷ reported on 16 patients between the ages of 19 and 35 with endometrial carcinoma. Menorrhagia, sterility, amenorrhea, and obesity were frequently observed in this group. Cortical fibrosis with cysts of the ovaries, which resembled the Stein-Leventhal syndrome, was noted in 4 of these patients. The ovarian changes suggested that the anterior pituitary gland, adrenal cortex, and ovary were all participating in hormonal imbalances. The possible importance of estrogen as a carcinogenic agent had been reported as early as 1939 by Dockerty and MacCarty.³³ Further work in the study of estrogenic influence in carcinoma of the body of the uterus was presented by Speert.³⁴ He noted a high incidence of uterine fundal carcinoma among women with cirrhosis of the liver, suggesting that there was a loss of estrogen breakdown in such women and that this acted as an indirect cause for the high estrogen level producing the carcinoma. In the report of Dockerty and Mussey,³² 16 cases of granulosa cell tumors of the ovary were presented in which associated uterine malignancy was found. Dockerty and Mussey³² cite the work of Greene³⁵ who observed a high incidence of metastasizing fundal carcinoma in old multiparous rabbits whose livers had been markedly impaired by repeated attacks of toxemia of pregnancy. Estrogen breakdown in the liver did not occur, giving indirect cause for a high estrogen level. They³² also cite the work of Banner and Dockerty,³⁶ and Herrell³⁷ who together presented a total of 87 cases of granulosa and theca cell tumors of the ovaries. Uterine carcinoma was reported in 15 of these cases; 3 had associated mammary carcinoma. The latter report also noted that uterine as well as mammary carcinoma was rarely observed following oophorectomy even though the adrenals still supply a small amount of estrogen.

CASE STUDY

During the past year, we have observed 2 verified cases of the Stein-Leventhal syndrome — a 19-year-old girl and a 37-year-old woman. The latter subsequently developed endometrial carcinoma. The following report is of the latter case.

This 37-year-old schoolteacher and housewife was first seen at the Clinic on May 23, 1957, with the complaint of amenorrhea since March 25, 1957. Her menstrual history disclosed that her periods had been irregular since onset of menstruation when she was in high school. Length of time between periods had varied from six weeks to three months, and the average duration of flow was seven days. She apparently had no difficulty in becoming pregnant and had borne 2 children, now 9 and 5 years of age. For the past three or four years, she had noticed excessive growth of hair on her face, upper legs, chest, lower abdomen, and pubic area, and she found it necessary to shave her chin at least every other day. No lowering of the voice or breast atrophy had occurred, and her facial contour was normal; there was no thyroid enlargement. The remainder of the physical examination was essentially normal. No shoulder hump or girdle obesity was noted, and routine laboratory examination yielded essentially normal findings, except for basal metabolic rate of -16 , which was felt to be unreliable because of complete lack of any other signs of hypothyroidism.

She was admitted to Jamestown Hospital on June 3, 1957. Skull and lumbosacral spine roentgenograms were taken, both of which were normal; an intravenous urogram was also normal. The fasting eosinophil count revealed 165 cells per cubic millimeter. Urinary 17-ketosteroid studies were obtained on 2 occasions and showed levels of 26.5 and 19.2 mg. per twenty-four hours.

Retroperitoneal insufflation of air was performed on June 8, 1958, in an attempt to outline the adrenal glands. The left renal area was fairly well outlined, but the right side was inadequately observed. A dilation and curettage were done, and the tissue obtained showed endometrium of mixed secretory type with the endometrial glands dated at about the seventeenth day and the stroma at about the twenty-third day of a twenty-eight day cycle; this was almost two months after her last period. Pelvic examination under anesthesia disclosed no abnormalities, and both ovaries were thought to be of normal size.

The patient was admitted to the hospital for the second time on June 17, 1957. A right subcostal incision was made on June 20, 1957, to explore the region of the right adrenal gland not properly visualized by the prior retroperitoneal air insufflation. The 11th rib was resected during this procedure, and the right adrenal gland was found to be normal in size and appearance; after a biopsy of this gland, the peritoneum was opened and the left kidney and adrenal gland were palpated and found to be of

normal size. The pelvis was also examined at this time, and the ovaries were thought to be very hard and somewhat enlarged. This incision was then closed, the patient was placed on her back, and a midline incision was made. Both ovaries were somewhat enlarged and very hard, and a bilateral oophorectomy was performed. Pathologically, both ovaries were described as being hard, white, and smooth-surfaced, and numerous smooth-walled serous cysts up to 7 mm. in diameter beneath a 1-mm. fibrous layer on the outer surface were seen. Microscopic section showed numerous small uniformly sized follicular cysts in a single line 1 to 3 mm. below the surface of the ovary. Extensive fibrosis was noted in the cortex of the ovary. These findings were felt to be compatible with the Stein-Leventhal syndrome by the pathologist. The biopsy of the right adrenal gland showed no significant gross or microscopic pathologic alterations. The patient was discharged on June 29, 1957. The only significant postoperative change was a diminished rate in the growth of hair.

In February 1958, she noticed some spotting and, on March 19, 1958, was again hospitalized. Dilation and curettage were performed, and a pathologic diagnosis of malignant adenoma was made. On April 2, 1958, a total hysterectomy and bilateral salpingectomy were performed. The uterus appeared grossly normal. Malignant adenoma was found with nests of epithelium invading the stalks of glandular tissue and secondary slight invasion of the myometrium. There was a rupture of the epithelial basement membrane, with atypical individual cells containing hyperchromatic nuclei, and invasion, at times, of the myometrium. The pathologic diagnosis was malignant adenoma and adenomyosis. She was discharged on April 9, 1958, and has done well postoperatively.

COMMENT

After having reviewed a fair amount of literature on the subject of the Stein-Leventhal syndrome, we find that, although it has been recognized for the past twenty-two years, controversy still exists as to its cause and not enough attention has been paid to the occurrence of endometrial carcinoma as a late manifestation of this syndrome.

The proposal of Jackson and Dockerty¹⁸ that the continuous estrogenic stimulation to the endometrium from the thickened theca interna of the ovaries in patients with Stein-Leventhal syndrome is the inciting agent in the ensuing carcinoma of the endometrium, together with the evidence presented by others concerning the ac-

tivity of estrogen per se from granulosa cell tumors and indirectly in instances such as hepatic cirrhosis, certainly gives one considerable food for thought regarding the role of estrogen in the production of carcinoma.

We have not been able to conclude whether estrogen per se is the carcinogenic agent or whether the hormonal imbalance in the endocrine system provides the basis for the sequence of events leading to carcinoma. Filling these gaps in our knowledge could lead to definitive therapy or certainly to further basic research concerning the problem of uterine carcinoma.

SUMMARY

1. The literature available to us concerning the Stein-Leventhal syndrome has been reviewed.

2. The interesting and incompletely investigated relationship between the Stein-Leventhal syndrome and endometrial carcinoma has been reviewed.

3. A case study in which both the Stein-Leventhal syndrome and endometrial carcinoma occur is presented.

4. We add our request to those of many others that this informative pathologic relationship be studied more completely and intensively.

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Maternal Mortality in North Dakota

JOHN H. MOORE, M.D.

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THE NORTH DAKOTA STATE MEDICAL ASSOCIATION and the North Dakota Society of Obstetrics and Gynecology, in cooperation with the North Dakota State Department of Health, continue to sponsor a research project in maternal mortality. It is a combined effort to reduce still further the already low maternal death rate and to improve the quality and standards of obstetric care throughout the state. The passage of House bill No. 599 by the thirty-fifth legislative assembly of North Dakota authorized research studies conducted by the State Department of Health and other agencies "for the purpose of reducing the morbidity or mortality from any cause or condition of health" and provided that such information "shall be confidential and shall be used solely for the purpose of medical or scientific research." These studies have been conducted in strict conformity with the law, and I am sure that I express the feeling of the Review Board, the several consultants who have conducted the individual surveys, the North Dakota State Department of Health, as well as my own feelings as coordinator of the program and consultant in obstetrics to the State Department of Health that they are proving most valuable as a research study into causes of maternal deaths.

The Maternal Mortality Review Board consists of practicing physicians in North Dakota appointed by the several district medical societies of the North Dakota State Medical Association, thus giving state-wide representation. The coordinator assigns the consultants for the various maternal death studies, receives and tabulates their reports, acts ex officio as chairman of the Review Board and presents each individual case to the Review Board with strict anonymity maintained as to name of patient, name of attending physician or physicians, and place of death.

Photostatic copies of death certificates are sent to me by Margaret Watts, director of the Bureau of Vital Statistics, as soon as she discovers a

death certificate for a maternal death or if pregnancy has been mentioned as having occurred six months before death. Such prompt reports, of course, furnish the bulk of our research material; but, in addition, reports are sometimes received from physicians and from hospitals where pregnancy had not been mentioned on the death certificates, not with any attempt to conceal the fact but simply because the reporter did not think such information was pertinent at the time the death certificate was signed. When such cases are reported to me, I request copies of the death certificates from the State Department of Health and refer them to consultants for study.

In our studies, we furnish each consultant with an 18-page questionnaire, designed by the Minnesota Maternal Mortality Study Committee and modified to suit our particular needs, and we gratefully acknowledge this courtesy from our Minnesota colleagues. By using such a questionnaire, we obtain a pertinent uniformity in the surveys even though they are conducted by various consultants, so that abstracting them for presentation to the Review Board is greatly facilitated. The physicians and the hospitals of North Dakota have even put themselves to considerable inconvenience at times to give our consultants the desired information so that when they are returned to me for abstracting, they often contain additional source material of much scientific value to the study.

The Review Board has classified North Dakota hospitals as follows: small rural hospitals, 30 beds or under; medium rural hospitals, 30 to 50 beds; metropolitan hospitals, 50 beds or more.

The classification adopted by the Review Board is simple and adequate in form but not so simple, though still adequate, in application. By individual vote of each member of the Board in attendance, the following questions are answered after each case has been individually presented and discussed: Was this an obstetric or a non-obstetric death? Was it preventable or nonpreventable? If it was preventable, was it the responsibility of (a) patient, (b) physician, (c) hospital or other responsibility, or (d) was it impossible to fix the responsibility?

The first meeting of the Review Board was

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Paper presented at the annual meeting of the North Dakota State Medical Association in Minot, May 1958.

held on April 27, 1956, when 11 deaths were reported. Seven of them occurred in metropolitan hospitals and 4 in medium rural hospitals.

Six cases included hemorrhage as either an immediate or an associated cause of death. These included 2 cases of postpartum hemorrhage, 1 from incomplete abortion, 2 said to have been associated with abruptio placentae, and 1 from a rupture of the uterus.

Two deaths were attributed to pulmonary embolus.

Four deaths were due to diseases complicating pregnancy. One was from acute infectious encephalitis, which was verified at autopsy; 1 was from acute hepatitis, with autopsy showing acute yellow atrophy of the liver secondary to the acute hepatitis; another was due to leukemia four months after the birth of her second child; and the fourth occurred at eighteen weeks' gestation from syringomyelia and bronchopneumonia, which were confirmed by autopsy and reported after the Review Board had met.

In summarizing the deaths of the 12 patients in this first series, hemorrhage was directly or indirectly etiologic in 50 per cent, embolism in 16.6 per cent, and disease in 33.4 per cent.

Of the 10 patients whose deaths were regarded as not preventable, 1 patient may represent patient and/or family responsibility and a second case, patient responsibility. There were 2 patients remaining in the series of 12 whose deaths the Review Board believed were the physician's responsibility. There were no primiparous patients in this first group. Gravidity ranged from 2 to 7 and ages from 27 to 42.

Since the Review Board had decided at its first meeting that it was not practical to hold regular meetings but that it would meet when the number of cases prepared by the coordinator warranted such a meeting, the next meeting was held on November 2, 1957. At that time, I presented 7 cases for the Board's consideration. Gravidity ranged from 1 to 15 with but 1 primiparous patient in the group. The majority of the Board decided that 4 of these deaths were preventable and that 3 were not preventable.

Before presenting the 1957 report of the Review Board, I present 2 charts, prepared through the courtesy of the Division of Vital Statistics of the North Dakota State Department of Health by Margaret Watts, director, and having a bearing on this problem of maternal mortality. These are the place of occurrence rates (table 1) and the residence rates, (table 2) and both are self-explanatory. It will be noted that maternal death rates, in both charts, are based on 10,000 live births. I have no immediate explanation for the

TABLE 1
PLACE OF OCCURRENCE RATES
NUMBER OF LIVE BIRTHS AND MATERNAL DEATHS
WHICH OCCURRED IN NORTH DAKOTA REGARDLESS OF
RESIDENCE OF MOTHER

Year	No. of live births	No. of maternal deaths	Maternal death rate per 10,000 live births
1950	17,183	9	5.2
1951	17,136	13	7.6
1952	17,158	7	4.1
1953	16,987	9	5.3
1954	17,472	6	3.4
1955	17,347	6	3.5
1956	16,833	2	1.2

Division of Vital Statistics, State Department of Health, December 12, 1957.

TABLE 2
RESIDENCE RATES
NUMBER OF LIVE BIRTHS AND MATERNAL DEATHS
OCCURRING TO RESIDENTS OF NORTH DAKOTA
AND MATERNAL DEATH RATE PER 10,000 POPULATION

Year	No. of live births	No. of maternal deaths	Maternal death rate per 10,000 live births
1950	17,076	9	5.3
1951	17,288	11	6.4
1952	17,356	6	3.5
1953	16,944	11	6.5
1954	17,432	6	3.4
1955	17,239	6	3.5
1956	16,626	2	1.2

Division of Vital Statistics, State Department of Health, December 12, 1957.

rise in 1951 and in 1953, but it is interesting to note the figures for the seven-year period, 1950 to 1956, inclusive, and to attempt to lower even the 1.2 figure for 1956. In 1935, when the North Dakota Committee on Maternal and Child Welfare was first formed and of which I had the honor to be chairman for ten years, the maternal mortality rate was 55 per 10,000 live births. In 1940, it had dropped to 17 per 10,000 live births, but, in 1943, it had risen to 29 per 10,000 live births, and it is interesting to note that in this year, obstetric hemorrhage went into first place as a cause of maternal deaths, ahead of infection and toxemia. An analysis of the individual case summaries of maternal deaths from hemorrhage during that year showed that 2 factors were chiefly responsible for the rise: (1) injudicious operative obstetrics and (2) inadequate blood or blood substitutes. The rate for 1945 was 11 per 10,000 live births.

Of the 7 patients in the 1957 series, 2, or 28-plus per cent, died from hemorrhage; 1 was

listed by the Review Board as nonpreventable and 1 as preventable.

Two patients died from rheumatic heart disease and 1 from multiple sclerosis, or 42-plus per cent. In 1 of the rheumatic heart disease cases, the Review Board felt that death might have been preventable and that it was due to patient neglect. The other death from rheumatic heart disease was classified as not preventable. The death from multiple sclerosis was classified as nonpreventable and nonobstetric.

Of the remaining 2 deaths, or 28-plus per cent, 1 from gangrene of the cecum with perforation was regarded by a majority of the Review Board as preventable and nonobstetric. The other from septic abortion was regarded nonpreventable by a majority of the Review Board, but the minority thought it was a preventable obstetric death with patient responsibility.

Autopsies were obtained in 4 of the 7 deaths, or in 57-plus per cent.

Five of the deaths occurred in metropolitan hospitals, but, in 3 of these, the patients were brought in for terminal care. One death occurred at a home to which the physician was called and where he pronounced the patient dead. In this case, history revealed carditis of twenty years' duration with mitral valve involvement, and, since there were no hospital records and preparum care had not been given, it was felt by the majority of the Review Board that an autopsy should have been done.

Life and death, those mysteries which remain such challenges to humanity and which we, as physicians, must try to interpret intelligently to our patients, leave us with a sense of great humility. In the presence of a maternal death, we are especially concerned because the patient died while trying to bring life and because the remarkable reduction of maternal deaths during the past quarter of a century in North Dakota, from 55 per 10,000 live births in 1935 to 1.2 per 10,000 live births in 1956, has made us even more critical in our analysis of any maternal death which does occur.

I have had members of the Review Board tell me that they regard service on that Board as most valuable postgraduate training in obstetrics, and the consultants have spoken similarly. I suppose that all of us have, at times, become annoyed at what seems unnecessary "paper work" in keeping office and hospital records; but let me present some comments of the Review Board on the most recent series of maternal deaths.

"Improper death certificate; no consultation, no laboratory work-up with facilities available, no progress reports written on chart, lack of in-

formation, *error of omission*. Hospital error: Lack of administrative medical control and poor record keeping."

Again, "Poor recording of nurses. No past history or prenatal record. No postpartum record. No laboratory work-up. Adequate space not provided for records."

In another instance, it was noted, "History and physical examination sketchy. No family history. No physician progress notes. No nurses' notes. No reference to vital signs. No blood pressure determination. Time elements very inaccurate. No notation as to time and amount of medication. No written consultation notes. No consultation suggestions on chart. No anesthetic record. No operative notes. No attention to left lower quadrant pain or to impending and current shock. No notation of postpartum procedures. No medical staff review of records. No note of autopsy on the chart."

It is not the contention of the Review Board or of the writer that perfect records would have saved the lives of these 3 women, but it is the feeling of the Review Board that obstetric practice in North Dakota would benefit greatly if a uniform system for keeping obstetric records could be introduced into our hospitals which, at present, do not have such systems. Reports should include information pertinent to the pregnancy and labor, and newborn records and a laboratory record should be kept. Also, progress notes, particularly in pathologic cases and those in which consultation is employed, should be accurately kept. Adequate review of the records by the staff and sufficient storage space to keep them is felt to be of great importance.

CONCLUSIONS

Obstetric hemorrhage continues to be a major cause of maternal deaths in North Dakota. We are very fortunate in having our state blood bank, plasma bank, and walking blood banks so widely distributed in North Dakota.

Certain medical diseases have caused a number of maternal deaths as listed in these 2 surveys, and no known cures are yet available for most of these. Nevertheless, these are important contributory factors in maternal deaths and emphasize the necessity for frequent consultations and adequate records in the hope that the disease may be arrested before a fatality occurs.

We have reached our enviable, low maternal mortality by patient and persistent efforts in the education of ourselves, our patients, and the public at large. Let us continue those efforts, for, in that way, lies still greater hope for the pregnant woman and her baby.

The Postoperative Chest, by HIRAM T. LANGSTON, M.D., ANTON M. PANTONE, M.D., and MYRON MELAMED, M.D., 1958. Springfield, Illinois: Charles C Thomas, 228 pages. \$8.00.

This is the second publication in the John Alexander monograph series on various phases of thoracic surgery. The format is of atlas style, presenting reproductions of roentgenograms with illustrative sketches selected from over 300 cases from the Chicago State Tuberculosis Sanitarium.

There are many roentgenographic changes seen in the postoperative chest pertaining to the incision, drainage tubes, ribs, diaphragm, mediastinum, pleura, and lungs which might be called "expected" changes, considering the surgery performed. Complications, such as excess air in soft tissues, pneumothorax, chronic pneumothorax, mediastinal emphysema, bleeding into soft tissues or pleural cavity, mediastinal displacement, infections, bronchopleural fistula, atelectasis, and pneumonia are illustrated.

The use of high kilovoltage technic is encouraged. Bronchography and laminography are freely used preoperatively and in the postoperative state in defining more precisely the extent and relationships of various lesions.



The correlation of type of surgical procedure, clinical condition of the patient, and time factors are utilized in evaluating the importance of the various roentgenologic findings that are encountered in the postoperative state.

CHARLES M. NICE, JR., M.D.

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The Conquest of Bovine Tuberculosis in the United States, by HOWARD R. SMITH, Somerset, Michigan. Order direct from the author. \$1.00.

This volume of less than 100 pages is an account of the most phenomenal accomplishment in tuberculosis control that has ever been achieved among animals or people in a major nation.

Table 3 of this book shows the effectiveness of this program. In 1917, of the 9,276,049 market cattle slaughtered, the carcasses of 8,418 had to be sterilized as unfit for food, and 40,756 were condemned because of tuberculosis; whereas in 1957, of the 20,141,371 market cattle slaughtered, the carcasses of only 16 had to be sterilized and only 196 condemned. This is a 99.7 per cent decrease in proportion to the number slaughtered. Among the 95,000,000 cattle in the United States during the fiscal year 1957, testing with tuberculin revealed that only 0.156 per cent were harboring tubercle bacilli.

In a most fascinating way, H. R. Smith, Doctor of Agriculture, tells how this accomplishment was achieved. In 1912, as head of the Department of Animal Husbandry at the University of Nebraska, Smith transferred to the chairmanship of the Department of Animal Husbandry at the University of Minnesota. In 1915, he became livestock specialist for the organizations which James J. Hill, St. Paul, represented, including the Great Northern Railroad and the First National Bank of St. Paul. In 1917, he became livestock commissioner for the market interests in Chicago in order to devote his entire time to educational

(Continued on page 454)

(CONCLUSION)

Transactions of the North Dakota State Medical Association

Seventy-First Annual Meeting

Minot, North Dakota, May 3, 4, 5, and 6, 1958

Report of the Reference Committee on Resolutions and New Business

Dr. T. E. Pederson, chairman of the committee, presented the following resolutions:

RESOLUTION

Whereas, the members of the North Dakota State Medical Association attending the seventy-first annual meeting of the association in Minot having enjoyed the hospitality and kindness of this fair city, and

Whereas, the mayor of Minot and his associates, the press, and radio, the hotels, and business men have made this session one long to be remembered,

Now, therefore, be it resolved that the House of Delegates express their appreciation by directing a copy of this resolution to the Honorable Mayor of Minot.

This resolution was adopted.

RESOLUTION

Whereas, the Woman's Auxiliary to the North Dakota State Medical Association has, through various projects entailing continuous work and effort, raised the sum of approximately \$14,000 for their Medical Student Loan Fund at the medical school of the University of North Dakota, and

Whereas, this fund has been of great value to many medical students and to the medical school, and

Whereas, other worthwhile projects, such as mental health and nurse recruiting; fostering *Today's Health* magazine; social legislative endeavors, especially those directed against the Forand bill; initiation of essay contests; and sponsorship of the Medical Student Wives' Association, all made for continuing good will for the medical profession in North Dakota,

Now, therefore, be it resolved that the House of Delegates of the North Dakota State Association convey to the Woman's Auxiliary of the association their appreciation and thanks for their excellent work and vision in their splendid projects, and

Be it further resolved that a copy of this resolution be directed to the president of the Woman's Auxiliary.

This resolution was adopted.

RESOLUTION

Whereas, the exhibitors have shown great effort and interest in this meeting and former meetings in developing their exhibits and adding to the scientific interest,

Now, therefore, be it resolved that the North Dakota State Medical Association extend to them our hearty welcome and thanks, and

Be it further resolved that a copy of this resolution be sent to each exhibitor.

This resolution was adopted.

RESOLUTION

Whereas, Dr. Leonard Larson, a trustee of the A.M.A.; Dr. Willard Wright, our delegate to the A.M.A. and chairman of the Medical and Related Facilities Committee of the A.M.A.; and Dr. C. J. Glaspel, secretary of the North Dakota State Board of Medical Examiners and past-president of the Federation of Medical State Boards have done yeoman service and brought honor to the North Dakota State Medical Association,

Now, therefore, be it resolved that this association take cognizance of their services and pay tribute to these men for their efforts on behalf of the North Dakota State Medical Association, and

Be it further resolved that a copy of this resolution be forwarded to each of these men.

This resolution was adopted by the members of the House of Delegates and given a round of applause.

RESOLUTION

Whereas, Dr. R. W. Rodgers, president of the North Dakota State Medical Association for the year 1957 and 1958 has given untiringly and unselfishly of his time and services toward the continued progress of medical practice in North Dakota,

Now, therefore, be it resolved that the assembled delegates show their appreciation by a rising vote of thanks.

A rising vote of thanks adopted this resolution.

RESOLUTION

Whereas, the A.M.A. interim meeting will be held in Minneapolis in December 1958, and

Whereas, the scientific session of this meeting is of such high caliber as to benefit the members of the North Dakota State Medical Association, and

Whereas, by our enthusiastic attendance at this meeting, great benefits could befall our profession in North Dakota,

Now, therefore, be it resolved that our executive secretary be directed to duly publicize this meeting to the end that members of our state association might attend this meeting in dedicated numbers.

This resolution was adopted.

RESOLUTION

Your resolutions committee considered at length the resolution presented by Dr. Edmund Vinje at the first session of the House of Delegates, directing the legislative research committee to sponsor legislation in the 1959 session of the North Dakota legislature designed to obtain a doctor of medicine as state health officer at a stated salary of \$12,500 per year. Your resolutions committee concurs with the intent of this resolution; namely, the early employment of a qualified medical doctor as state health officer. But, because of the incorporation of salary limitation in the original resolution, your committee rejects said resolution and offers the following substitute resolution:

Whereas, North Dakota is the only state in the United States which does not have a doctor of medicine as state health officer, and

Whereas, the need for a qualified doctor of medicine as state health officer is necessary for the health welfare of our state,

Now, therefore, be it resolved that the House of Delegates of the North Dakota State Medical Association direct the state health council to obtain a qualified doctor of medicine as state health officer at the earliest possible date.

Dr. Pederson moved the adoption of this substitute resolution. Motion was seconded by Dr. Vinje and adopted.

RESOLUTION

Your reference committee has considered the resolution presented by Dr. Lund, chairman of the Committee on Cancer, at the first session of the House of Delegates referring to the establishment of a central cancer registry, and your reference committee wishes to delete the last paragraph of said resolution which reads: "Be it resolved that the North Dakota State Medical Association recommend the establishment of a central cancer registry to be established and maintained at no expense to the North Dakota

Medical Association and be located and maintained by the Bureau of Vital Statistics of the United States Public Health Service in Bismarck."

Your reference committee offers the following resolution as a substitution for the deleted paragraph:

Now, therefore, be it resolved that the House of Delegates of the North Dakota State Medical Association recommend the early establishment of a central cancer registry, and

Be it further resolved that this project be referred back to the Committee on Cancer for further study and report to the council at its interim session.

Dr. Pederson moved the adoption of this resolution as amended. Dr. Nugent seconded and the resolution was adopted.

RESOLUTION

Your resolutions committee considered the resolution presented at the first session of the House of Delegates by the delegates from the First District Medical Society, referring to accredited attendance at State Medical Association deliberations by lay "observers." Your committee wishes to amend this resolution with the following stipulation in the first sentence of the last paragraph, to read: "If the sponsoring district society approval is accomplished by a majority vote of the membership, the Credentials Committee shall be authorized to accept these individuals as "observers."

This resolution, with the amendment, was adopted.

RESOLUTION

The following resolution of the North Dakota Physicians Service Board of Directors was presented to your resolutions committee as a related resolution.

Whereas, North Dakota Physicians Service is legally organized by doctors of medicine to provide a prepayment plan for eligible North Dakota residents who by reason of illness or accident require the professional services of a doctor of medicine; and

Whereas, North Dakota Physicians Service can by law and physician contracts pay doctors of medicine for professional services only where such services are rendered or supervised by a doctor of medicine who customarily bills patients for his services; and

Whereas, North Dakota Physicians Service subscribers who utilize the facilities of the outpatient department of a hospital for pathology, radiology, and radiotherapy services receive no benefits from Blue Shield when any of these before mentioned professional services are billed as hospital services by the hospital to the patient;

Now, therefore, be it resolved that the North Dakota Physicians Service Board of Directors respectfully requests that the council of the North Dakota State Medical Association be made aware of this situation and take such action as it deems necessary with the North Dakota Hospital Association to arrive at an agreement as to whether these before mentioned services should properly be considered professional services or hospital services and, if professional services, the cost of such to be paid by Blue Shield and, if hospital services, the cost of such to be the proper responsibility of Blue Cross.

Your reference committee recommends that this resolution be referred to the Committee on Medical Economics for consideration and report to the council at its interim meeting.

This portion of the report was adopted.

RESOLUTION

Whereas, the seventy-first annual meeting of the North Dakota State Medical Association has thoroughly enjoyed and profited by the scientific program, and

Whereas, the host, the Fourth District Medical Society and the various chairmen and committeemen have excelled in providing the membership of the association with the niceties of a gracious convention,

Now, therefore, be it resolved that assembled delegates demonstrate their appreciation by a rising vote of thanks.

A rising vote of thanks adopted this resolution.

Dr. Pederson moved the adoption of the report as a whole. Dr. Van der Linde seconded the motion, and the report as a whole was adopted.

T. E. PEDERSON, M.D., Chairman
F. A. DECESARE, M.D.
R. W. HENDERSON, M.D.
F. D. NAEGELI, M.D.
ROBERT PAINTER, M.D.

NEW BUSINESS

The Chair next entertained a motion for fixing the per capita dues for the ensuing year.

Dr. Mahowald moved and Dr. Mahoney seconded that the dues remain the same. Motion was passed.

The next order of business was the report of Dr. C. J. Glaspel, secretary of the State Board of Medical Examiners.

The Chair at this time entertained an invitation for the location of the 1959 meeting. Through a conflict with the dates for the 1959 meeting of the North Dakota State Dental Association, the meeting normally scheduled for Grand Forks cannot be held.

Dr. Carl Baumgartner, representing the Sixth District Medical Society, extended an invitation to the House of Delegates to meet in Bismarck in 1959, and he moved that this invitation be accepted. Motion was seconded by Dr. Nugent and carried.

The Chair stated that it was felt that the selection of a meeting place for our regularly scheduled annual meetings should be made at least two years in advance to eliminate such a conflict as has arisen in 1959.

Dr. Mahowald, representing the Grand Forks District Medical Society, extended an invitation to the North Dakota State Medical Association to meet in Grand Forks in 1960. He moved that the invitation be accepted and Dr. Fischer seconded the motion. Motion was carried.

Report of the Nominating Committee

Dr. E. T. Keller, chairman, gave the following report of his committee:

President	Dr. O. A. Sedlak, Fargo
President-elect	Dr. J. C. Fawcett, Devils Lake
First vice-president	Dr. C. M. Lund, Williston
Second vice-president	Dr. E. H. Boerth, Bismarck
Speaker of the House	Dr. G. A. Dodds, Fargo
Vice-speaker of the House	Dr. R. E. Leigh, Grand Forks
Secretary	Dr. R. D. Nierling, Jamestown
Treasurer	Dr. E. J. Larson, Jamestown
Delegate to the A.M.A.	Dr. W. A. Wright, Williston
Alternate delegate to the A.M.A.	Dr. T. E. Pederson, Jamestown

Councillors (Terms expiring in 1961):

Second District	Dr. G. W. Toomey, Devils Lake
Seventh District	Dr. T. E. Pederson, Jamestown
Ninth District	Dr. A. R. Gilsdorf, Dickinson
Eighth District	Dr. J. D. Craven, Williston

Board of medical examiners (terms expiring in 1961):

Dr. D. J. Halliday, Kenmare; Dr. V. G. Borland, Fargo; and Dr. C. A. Arneson, Bismarck.

State Health Council:

Dr. R. F. Gilliland, Dickinson

Dr. Johnson moved that the report of the nominating committee be accepted. Motion was seconded by Dr. Fawcett and passed. The nominations were accepted unanimously, and all nominees have been elected.

E. T. KELLER, M.D., Chairman
A. K. JOHNSON, M.D.
F. A. DECESARE, M.D.

Speaker Dodds next addressed the delegates concerning a change in the Constitution as approved at the 1957 session. Authority was given by the House to print the Constitution with the motion as being adopted, so that the reprinting include the suggested revisions in the Constitution. This, of course, requires action by this 1958 session. On the assumption that the House would pass this revision in the Constitution, the Constitution and By-laws were printed. Secretary Boerth was requested to read this change, which must be adopted or disapproved at this time.

Article IX, Section 2 reads:

The president, the president-elect, vice-presidents, secretary and treasurer shall be elected annually by the House of Delegates to serve for a term of one year. The councillors shall be elected by the House of Delegates annually to serve for a term of three

years; limit of consecutive terms shall be two. Instances where councillors are elected to fill the unexpired terms of previous councillors, the portion of the unexpired term shall not be included in the limit of the two consecutive terms referred to above. The term of the councillor-at-large shall not be included in the limit of the two consecutive terms referred to above.

Dr. Gillam moved that the House approve this revision of the constitution. Motion was seconded by Dr. Hammargren and carried. The above revision of the constitution is approved.

There being no further new business to come before the House, the Chair at this time thanked the delegates for their efforts and again reiterated the advice given by the president that the delegates select 1 delegate to report to their district society on the transactions of this annual session.

The motion was made, seconded, and passed for adjournment. Meeting adjourned at 5:00 P.M.

SCIENTIFIC PROGRAM

May 5, 1958

Municipal Auditorium, Minot

- 8:30 to 9:15 A.M.—Registration.
- 9:15 to 9:30 A.M.—Greetings from mayor of Minot and president of the Northwest District Medical Society.
- 9:30 to 10:00 A.M.—“The Failure of Extensive Partial Gastrectomy with Gastro-Duodenostomy in the Treatment of Duodenal Ulcer,” DR. NORMAN ORDAHL, Dickinson.
- 10:00 to 10:30 A.M.—“Prevention and Management of Infections in Fracture Treatment,” DR. JOHN H. MOE, Minneapolis.
- 10:30 to 11:00 A.M.—Intermission to view exhibits.
- 11:00 to 11:30 A.M.—“Injuries to the Urinary Tract,” DR. HERBERT E. LANDES, Chicago.
- 11:30 to 12:00 noon—“Thoracic and Abdominal Injuries,” DR. G. ALFRED DODDS, Fargo.

NOON RECESS

- 1:30 to 2:00 P.M.—“Some Uncommon Complications of Pyelonephritis,” DR. EDWIN G. OLMSTEAD, Grand Forks.
- 2:00 to 2:30 P.M.—“Curable Hypertension,” DR. RAY GIFFORD, JR., Rochester.
- 2:30 to 3:00 P.M.—“Presymptomatic Diagnosis of Cancer,” DR. W. ALBERT SULLIVAN, JR., Minneapolis.
- 3:00 to 3:30 P.M.—Intermission.
- 3:30 to 4:00 P.M.—“Male Hypogonadism,” DR. L. O. UNDERDAHL, Rochester.
- 4:00 to 5:00 P.M.—“Clinicopathological Conference,” DR. J. D. CARDY, Grand Forks, moderator; DR. RAY W. GIFFORD, JR., Rochester; DR. L. O. UNDERDAHL, Rochester; and DR. LAURENCE G. PRAY, Fargo.
- 6:30 P.M.—Special society dinner meetings.

May 6, 1958

Municipal Auditorium, Minot

- 8:30 to 9:00 A.M.—Registration.
- 9:00 to 9:30 A.M.—“Human Infertility: Newer Concepts of Diagnosis and Treatment,” DR. JOHN S. GILLAM, Fargo.
- 9:30 to 10:00 A.M.—“Maternal Mortality in North Dakota,” DR. JOHN H. MOORE, Grand Forks.
- 10:00 to 10:30 A.M.—“Advances in Hearing Restoration,” DR. O. E. HALBERG, Rochester.
- 10:30 to 11:00 A.M.—Intermission, exhibit time.
- 11:00 to 11:30 A.M.—“Common Cerebrovascular syndrome, Diagnosis and Treatment,” DR. A. B. BAKER, Minneapolis.
- 11:30 to 12:00 noon—“Surgical Diseases of the Large Intestine in Infancy and Childhood,” DR. TAGUE C. CHISHOLM, Minneapolis.

NOON RECESS

- 1:30 to 2:30 P.M.—“Presidential Address,” DR. R. W. RONGERS, president, North Dakota State Medical Association.
- 2:30 to 3:00 P.M.—“The Treatment of Intractable Pain,” DR. WALLACE P. RITCHIE, St. Paul.
- 3:00 to 3:30 P.M.—Intermission.
- 3:30 to 4:00 P.M.—“X-Ray Examination of GI Tract, Demonstrated by Cide-Fluoroscopy,” DR. JOSEPH JORGENSEN, Minneapolis.
- 4:00 to 5:00 P.M.—Panel Discussion: “Intestinal Obstruction,” DR. NORMAN ORDAHL, Dickinson, moderator; DR. TAGUE C. CHISHOLM, Minneapolis; DR. WALLACE P. RITCHIE, St. Paul; DR. R. F. NUSSLE, Bismarck; and DR. JOSEPH JORGENSEN, Minneapolis.

PRESIDENTIAL ADDRESS
R. W. Rodgers, M.D.

It is just thirty years ago today since I arrived from Canada to begin the practice of medicine in North Dakota. This has covered a period of many brilliant advances in the science of medicine and surgery, with the extension of life expectancy by over ten years. During this same time, there have been many far reaching socio-economic changes, and it is to this aspect that I wish to direct your attention today.

We live in the last great outpost of free enterprise capitalism, yet the medical profession is in the paradoxical position of fighting that which seems to be a losing battle to save itself—a very significant phase of this system from going down the road to socialization. While it is a firm conviction that the majority of the United States citizens do not truly wish a socialized state, a socialized nation, or socialized medicine, nevertheless, we have constantly lost ground during the last two decades. Chipping away of professional freedom and its acceptance by the people cannot be easily combated. Socialism is just like pregnancy—one cannot have just a little—it grows and grows. In democracies, the welfare state is the beginning and the totalitarian state the end. The two submerge into the third sooner or later.

There are at present 43 million people, or one-fourth of the population, eligible to receive some medical or hospital aid from governmental sources, and new legislation may add 7 million more. Should the Forand bill be passed, adding another 13½ million to those eligible for assistance, about one-third of our population would then be encompassed. Public national health cost in the United States in 1955 was \$3.9 billion, and public costs have since risen sharply. In Great Britain under socialized health insurance, the cost of the scheme amounts to more than 10 per cent of the national budget. This cost has risen over 300 per cent in the past nine years, during which time retail prices rose only 40 per cent. This surely shows that governmental medical care is not free. Yet, while the total cost is great, the economic position of the British doctor is pathetically low compared to ours under the free enterprise system.

The reasons for this trend toward socialization are many and varied. Some are obvious, others more subtle and insidious. The demand by the public is demonstrated by the increasing number of health bills introduced by each succeeding Congress: 250 health measures in the eighty-second congress, 407 measures in the eighty-third Congress, and 571 measures in the eighty-fourth Congress. Rising hospital costs no doubt have stimulated the trend. It would be well for us to consider what part our own profession has played. We should ask ourselves why it is that organized medicine is so often made the "whipping boy?" Has the doctor been demoted from his once proud pinnacle of respect and influence in the community and, if so, why? We should ascertain what the true feelings of the public are toward doctors individually and collectively and, with these and other pertinent facts at our disposal, employ that most difficult of all arts—self criticism. It is our privilege to defend that which is right and our moral responsibility to correct that which is wrong.

It is an odd state of affairs when the vast majority of persons think of their own private physician as an honorable, trustworthy individual whose integrity they do not doubt, who is ever willing to answer promptly their every beck and call, and into whose hands they are willing to place themselves when their very life depends on his ability. Yet, they view all other doctors and the asso-

ciation of doctors as an evil thing engaged solely in acquiring power for themselves, regardless of the welfare of the people as a whole.

The medical profession, as no other profession, has the public confidence in its skill, proficiency, and self-dedication. But, we cannot sit in our ivory towers and assume that everyone knows we are doing a good job. The time is long past due when every doctor must appreciate the importance of the science of public relations.

A generation ago, the humble family physician needed no knowledge of this art. With his genuine human sympathy and understanding, his close association with the family in their home surroundings, his intimate knowledge of their hopes and tribulations, he was often counsellor as well as doctor. He was present at the birth of life, he protected it and ministered to its wants through its earthly journey, adding to its comfort and happiness and, at its termination, he brought solace and comfort to the relatives. He was a true friend and he was held in reverential awe.

But with the changing type of medical practice and with more intense specialization, the doctor is rapidly losing this close personal contact with the patient, and with this appears to have come a changing attitude by the public. The patient is apt to be shifted from one specialist to another, depending upon which part of his anatomy is ailing. His bill for service is made out on a modern billing machine, and his payments are made to the grim business manager, who to many appears to lack the milk of human kindness. Medicine to many appears to be just another business. No one doubts that the patient receives good medical service and good medical care. This is good public relations, but this alone is not enough. We must develop and display a deep personal concern for the patient and his welfare. The utilization of good public relations are as much part of medicine as is the science and art.

Every doctor should deliberately enter into the experiences and assume the responsibilities and the disciplines that have to do with the art of human relations. We must live up to our responsibilities. It is necessary that we have not only a deep and consuming interest in our profession but also in the problems of the public and, particularly, the communities in which we live. We must be good citizens before we can be good doctors.

We must espouse the cause of medicine in our home communities as well as on a state and national level. Our relationship with the press must be improved by courteous consideration of their requests for information and cooperation in their efforts to inform the public. Before one obtains understanding, there must be communication, and the public must be given a clear insight into the problems of our profession, an appreciation of our aims, the high standards of our ethics, and a frank knowledge of our performance.

In the conduct of our practices, there are many areas in which we can improve our public relations. Careful choice of our receptionists and technical assistants is most important. The first contact at the time the patient enters the office often leaves a lasting impression. Therefore, courtesy, kindness, and understanding is mandatory. Appointments should be kept as nearly on time as possible, and we must display reasonable concern for our patients' time. They should never be left with the impression that they are being rushed through, but time must be allowed to hear the patient's story. Careful, thorough examinations followed by frank explanation will correct the complaint so often heard, "The doctor never tells me anything!" Explain what can be ex-

pected from the treatment. Give to every patient the very maximum care within our potentiality.

In the best interest of the patient, we cannot ignore his economic problems. There is too much reluctance on the part of physicians to frankly discuss with the patient or his family the probable cost of treatment, and this has been a source of much misunderstanding. Much better relations will exist if the patient has a full understanding of the cost before treatment is initiated, and we will have to learn to overcome our distaste for this phase of practice.

One of the criticisms of our profession is that we are always against but never for anything. Opposition alone is not enough. We cannot procrastinate and wait until agitators put us on the defensive by proposing something we cannot accept. We must not let the politicians write the bills. We must write them so that when the time comes we can say, "This is right, this is proper, this is what is best in the public interest." This will put them rather than ourselves on the defensive. We must look forward and anticipate new problems as they arise and find the answers for their solution. We cannot become defeatists but must resolutely go forward with the firm conviction that we are masters of our fate. We cannot let the chains of regimentation tighten about us and forever hold us in bondage, preventing us from exercising our personal responsibility. We must adhere to and actively support the principles of constitutional government and protect our precious liberties. Every encroachment must be combated with every power at our command. This requires that the apathy of many of our members be dispelled, that every member become enlightened on legislative matters, that he discuss the problems with his patients, and that he provide active leadership and participation in all good government organizations.

The physician is the one most concerned with socialization because health care is the first item any government tries to socialize by reason of universal appeal to the masses. If medicine fails, there is nothing else that cannot be subjugated. Physicians, individually and collectively, will probably determine whether or not medicine is socialized. The attitude of every individual citizen toward his own as well as all other doctors will be an important determining factor. If we establish fees beyond the reach of the patient to pay without economic hardship or if our fees force voluntary insurance rates to rise beyond the economic ability of the subscriber, we are by such action fostering the socialization of our profession.

Arrogance has no place in our profession. We can hold our own or win out in the great human competition only if we approach our tasks with humility, recognizing the very substantial and often surprising talents of others. We must recognize that we do not enjoy an inherited superiority and that we merit the respect and approbation of society only if we adhere to the traditions and ethics handed down to us by our predecessors. We must continue to foster and maintain congenial relationships with our fellow practitioners, studiously avoiding all public criticism and evidences of bickering. It would be well for us to take to heart this advice given by an author whose name I have unfortunately lost, "When you have the goods on a man, just sit down and think it over before you proclaim his shame to the world. Frisk yourself over carefully and, if you find nothing in your life that you are ashamed of and nothing that you would not like to see in print, go ahead and get yourself a megaphone."

Many of our members need a better understanding of the Blue Shield program. Launched by the medical

profession, it has become the foundation of the voluntary prepaid system. Distribution of medical care is a social problem, and making this care available to all who are not medically indigent at a cost they can afford to pay is the job of Blue Shield in cooperation with the medical profession. Judge Ben C. Willis of the circuit court of Florida said, "I would like to impress upon you that Blue Shield is yours; it is yours to continue to grow and continue to serve, or it is yours to destroy. It will do one or the other, it will not stand still. Blue Shield must meet changing conditions; it must meet competition; it must seek to give that service to the public which the public is demanding and which it will get one way or the other, either from government or from commercial companies."

More than any other single factor, Blue Shield has prevented the socialization of medicine. Strenuous efforts must be made to make all doctors cognizant of the philosophy and work of Blue Shield and the importance of Blue Shield in warding off government medicine. Fifty per cent of doctors in practice have graduated since 1939, and this is since Blue Shield was started, hence the necessity of continued indoctrination of doctors about the philosophy behind Blue Shield. Local county medical societies should develop informed committees. Blue Shield preserves the finest we have in our system of economics. It recognizes the value of free enterprise; it recognizes the freedom of choice of the patient and the physician. We must find ways and means of convincing some of our members that even though Blue Shield was organized by the physician, it is not operating solely for the benefit of one specialty group, let alone one doctor, but that it operates for the benefit of the subscriber also. Blue Shield is far from perfect, but if we apply ourselves diligently to the task, any deficiencies can and will be corrected. Blue Shield is faced with many problems, among which are: (1) more comprehensive care for the patient, (2) coverage of those not at present covered, and (3) the answer which open panels must give to the closed panel type of practice.

Plans must immediately be started for the extension of prepayment care of the aged and retired as a constructive answer to the proposed legislation, such as the Forand bill, for the care of this segment of our population.

The future of our medical schools is a proper concern of every physician. We are obligated to train young men and women who can competently take our places when our usefulness has passed. The medical schools are in financial difficulty and governmental aid has been suggested. This thought should be abhorrent to all physicians. Medical schools must remain free, and it is perhaps trite to repeat the Supreme Court ruling of 1942. "It is hardly lack of due process for government to regulate that which it subsidizes." We have the method at our disposal which can, if we will only seriously support it, materially help to keep these schools free. I am grieved to report that there is still a large segment of our membership who have not yet been convinced that it is not only our privilege but our duty to make an annual donation to our medical schools. It appears that much educational work must be done before we can approach our goal of having every physician participate in this program.

A second problem of the medical school is the lack of sufficient applicants for admittance who are properly qualified. This is true in our own North Dakota school. A recent letter from Dean Harwood states, "We always scrape the bottom of the barrel. Of 52 applications from North Dakota students, we could not find 40 who met

all the requirements and had a 1.5 average. Our committee on admissions voted to admit 1 doctor's son from among 5 who applied (several were from out of the state). I think the basis of the problem is that very likely the average busy doctor does not have time to give much attention to his youngster's intellectual development. You would be surprised if I showed the records of these 5 doctors' sons who have applied." To me this letter has strong implication. It indicates a serious flaw in the quality, if not in the quantity, of our high school educational system. Let us get social education back in the homes and scientific education back in the schools. Let us develop students who have a fundamental knowledge of how to read, write, and spell and to express themselves adequately. Let us inspire their quest for knowledge and an appreciation of the value of hard work as well as the satisfaction of a job well done and instill a proper appreciation of moral and spiritual values. Let us as citizens in our communities crusade for better education.

But, I am more disturbed by the implication that perhaps we ourselves are failing in our responsibility to youth and even our own children. Has materialism affected our faith in the social factors of man? What flaw is there in the conduct of our lives that we fail to inspire the bright and serious youth of our acquaintanceship to enter what appears to us the most rewarding of all professions. These questions we must answer.

A revised version of an article from the *Continental Digest* has a philosophy which is worthy of our consideration. "What is a patient?" There have been times in recent years when some patients themselves have wondered. In segments of the professional world, the attitude toward them was indifference to say the least, but here is reassurance; here is what good professional reasoning really comes up with about the matter.

A patient is the most important person in any practice. A patient is not dependent upon us; we are dependent on him. A patient is not an interruption of our work; he is the purpose of it. A patient does us a favor when he comes for an appointment; we are not doing him a favor by serving him. A patient is part of our business, not an outsider.

A patient is not a cold statistic; he is a flesh and blood human being with feelings and emotions like our own. A patient is not someone to argue and match wits with.

A patient is a person who brings us his needs; it is our job to fill those needs. A patient is deserving of the most courteous and attentive treatment we can give him.

A patient is the fellow who makes it possible for us to earn a living. A patient is the life blood of mine and every other doctor's practice.

I wish to express my thanks to the officers and members of our association, who have during the past year given so graciously of their time and efforts to assist me in the conduct of the affairs of this society. May I again say to all the members of the North Dakota State Medical Association that the honor of having been permitted to serve as your president is deeply appreciated.

Introduction: Honorary Members and Fifty-Year Club Members

DR. R. W. RODGERS: I now come to a very pleasant part of the program, the recognition of the Fifty-year members. To belong to this group, one must practice medicine for fifty years. In the future, it will be difficult to reach this mark, as, at present, a man needs four years of college, four years of medical school, and two years in the army. Consequently, he is not young when he begins the practice of medicine. With this thought in

mind, it was decided that the Fifty-Year Club should be made up of those who graduated from medicine fifty years ago.

We have with us today, 2 members whom we would like to honor. The first is Dr. Howard B. Huntley, of Kindred, the father-in-law of the Honorable John Davis, governor of North Dakota. Dr. Huntley has been a member of the First District Medical Society since 1924, having formerly practiced in Leonard. He was born April 14, 1876, at Bloomville, Ohio, graduated from Northwestern University in 1908, and was licensed in North Dakota in July, 1908. Ordinarily he would be presented with both a Fifty-Year Club pin and certificate and an honorary certificate, but, according to the revised Constitution and Bylaws, anyone who graduated from medical school fifty years ago is now considered an honorary member.

Dr. Huntley, the North Dakota State Medical Association does hereby award you the Certificate of Distinction in recognition of your practice of medicine for fifty years or more. Your untiring ministry to the ill has done honor to God, your community, your profession, and yourself. Permit me to have the honor of pinning this Fifty-Year pin to your lapel.

I would also like to introduce Mrs. Huntley who has been his helpmate.

We are also honored today to pay tribute to another member of our association, Dr. L. H. Landry, of Wall-halla. He was presented with a Fifty-Year Club pin in 1954. Doctor Landry graduated from the LaValle University, Montreal, Quebec, in 1904. He was licensed in North Dakota in 1908.

Through your proficient and untiring ministry to the ill, Dr. Landry, you have done honor to God, your community, your profession, and yourself. In recognition of your unselfish devotion to your profession, the North Dakota State Medical Association hereby awards you the Certificate of Distinction.

I would also like to introduce Mrs. Landry.

It is indeed a pleasure to have you gentlemen and your wives here today. We have one other member who is eligible, but unfortunately he was unable to attend today. His Fifty-Year pin and certificate will be mailed to him. He is Dr. George H. Spielman, of Mandan, a member of the Sixth District Medical Society and a member of the North Dakota State Medical Association since 1924. He formerly practiced in Garrison and Flasher. He was a specialist in proctology. Dr. Spielman was born on July 16, 1881, in Shakopee, Minnesota. He graduated in 1908 from Loyola University of Chicago, and was licensed in North Dakota in July of 1909.

These 3 gentlemen are now considered honorary members of the North Dakota State Medical Association.

I now have another very pleasant duty to perform—the introduction of our next president. He has served medicine well in many ways. Dr. Waldschmidt, will you escort Dr. Sedlak, of Fargo, to the platform, and I ask that all of you stand and salute your next president.

INAUGURAL ADDRESS O. A. Sedlak, M.D.

I want to thank you for the honor bestowed upon me, and I hope that a year from now I can stand before you and you will say "well done, good and faithful servant."

There are many problems and difficulties in the education of a medical student, but they are not more difficult than the continuous education of the general practitioner. Over the first, we have some control; over the other, none. The university and the state board make sure that the former has a minimum, at least, of profes-

sional knowledge, but who can be certain of the state of knowledge of the latter in five or ten years from the date of graduation? The specialist may be trusted to take care of himself. His existence demands that he shall be abreast of the times, but the family doctor—the private in our great army, the essential factor in the battle—should be carefully nurtured by the schools and carefully guarded by the public. Humanly speaking, with him rest the issues of life and death, since upon him falls the grievous responsibility in those terrible emergencies which bring darkness and despair to so many households. No class of men needs to call to mind more often the wise comment of Plato that education is a lifelong business.

The difficult problem before us relates to the education of the practitioner after he has left school. The foundation may not have been laid upon which to erect an intellectual structure, and too often the man starts with a total misconception of the prolonged struggle necessary to keep the education he has, to say nothing of bettering the instruction of the schools. As the practice of medicine is not a business, and can never be one, the education of the heart—the moral side of the man—must keep pace with the education of the head. Our fellow creatures cannot be dealt with as a man deals in grain or coal, the human heart by which we live must control our professional relations.

For better or worse, few occupations are more satisfying than the practice of medicine. During college days, a man may have worked hard, but whether he becomes successful or a miserable failure depends upon his attitude toward study after leaving school. After all, the killing vice of a young doctor is intellectual laziness. Without specific subjects upon which to work, he acquires the newspaper or the novel habit and fritters away his energies upon useless literature. Habits of systematic reading are rare, and five or ten years after he obtains his license, the young doctor may know less than when he started.

Here is where the medical society may step in and prove his salvation. The doctors' postgraduate education comes from patients, books and journals, and from societies, which should be supplemented every three to five years by a return to a postgraduate school to overcome an almost inevitable slovenliness in methods of work.

One of the most important functions of a medical society is to lay a foundation for unity and friendship, which is essential to the dignity and usefulness of the profession.

Unity and friendship—how we all long for them but how difficult to attain. Strife instead seems to be the very life of the practitioner whose warfare is incessant against disease, ignorance, and prejudice, and, sad to admit, he too often lets his angry passions rise against his professional brothers. Most of the quarrels among doctors are about nonessential, miserable annoyances—the pin pricks of practice—which would sometimes try the patience of Job, but the goodfellowship and friendly intercourse of the medical society should reduce these to a minimum.

The well conducted medical society should represent a clearing house in which every physician would receive his intellectual rating, and in which he could find out his professional assets and liabilities. It would keep his mind open and receptive and counteract the tendency to premature senility, which is apt to overtake a man who lives in a routine.

Why do doctors remain out of the folds of their local medical societies or refrain from attending meetings if they do belong? In part, this may be due to apathy on the part of the officers and failure to present an attractive program, but more often the fault is in the man. Perhaps a doctor feels it a waste of time to join a society, and so it is if he is in the profession only for the money he can get from patients without regard to his sacred obligation to put himself in the best possible position to do the best that is known for his patients. More frequently, I fear, the "dollar-doctor" is a regular frequenter of the society, knowing full well that in the long run isolation from the general body of the profession is suicidal. The man who knows it all and receives nothing from the society reminds one of that little dried-up miniature of humanity, the prematurely senile infant whose tabetic marasmus has added old age to infancy. Why should he go to the society and hear Dr. Jones speak on the gastric relations of neurasthenia when he can absorb it much better in the works of Ewald? He is weary of seeing appendicees, and there are no new pelvic viscera for demonstration. It is a waste of time, he says, and he feels better at home, and perhaps that is the best place for a man who has reached this stage of intellectual stagnation.

Greater sympathy must be felt for the man who started out all right and worked hard in the societies, but, as the rolling years have brought ever increasing demands on his time, the evening hours find him worn out and yet not able to rest, much less to snatch a little diversion or instruction in the company of his fellows whom he loves so well. Of all the men in the profession, the 40-visit-a-day man is the most to be pitied. Not always an automaton, he may sometimes by economy of words and extraordinary energy do his work well, but too often he is the one above all others who needs the refreshment of mind and recreation that is to be had in a well conducted society. Many good men are ruined by success in practice and need to pray the prayer of the Litany against the evils of prosperity. It is only too true, as you know well, that a most successful—as the term goes—doctor may practice with a clinical slovenliness that makes it impossible for that kind old friend, Dame Nature, to cover his mistakes. A well conducted society may be of the greatest help in stimulating the practitioner to keep up habits of scientific study.

These words have been taken almost verbatim from a speech given by Sir William Osler some fifty-five years ago. The words he uttered then could just as well have been original thoughts of mine today. New problems have been added throughout the years, but the basic principles of the society remain the same.

Years ago some Sister slipped this little eard into my pocket. It is entitled "A Physician's Prayer":

*Dear Lord, Thou Great Physician, I kneel before Thee.
Since every good and perfect gift must come from Thee, I pray:
Give skill to my hand, clear vision to my mind,
Kindness and sympathy to my heart.
Give singleness of purpose, strength to lift at least a part
of the burden of my suffering fellowmen and a true realization
of the privilege that is mine.
Take from my heart all guile and worldliness that with the
simplest faith of a child I may rely on Thee.*

Amen

Many a time when the going was rough, I read this prayer and it always gave me new strength and courage to carry on. With this prayer on my lips, I accept the office of president of the North Dakota State Medical Association.

North Dakota State Medical Association Roster—1958

MEMBERSHIP BY DISTRICTS

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 Bacheller, Stephen C. Enderlin
 Bakke, Hans Lisbon
 Barnard, Donald M. Fargo Clinic, Fargo
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 Beithon, Paul J. Red River Valley Clinic, Wahpeton
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 Christu, Chris M. Fargo Clinic, Fargo
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 Fercho, Calvin K. 812 Black Bldg., Fargo
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 Ivers, George U. 424 deLendrecie Bldg., Fargo
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 Painter, Robert C. Grand Forks Clinic, Grand Forks
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 Youngs, Nelson A. Grand Forks Clinic, Grand Forks
 Yury, Walter E. 1004 Hill Ave., Grafton

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 Boyum, Lowell E. Harvey
 Boyum, P. A. Harvey
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 Devine, J. L., Sr. Great Plains Clinic, Minot
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 Dormont, Richard E. Northwest Clinic, Minot
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 Kermott, L. H., Sr. 12A S. Main St., Minot
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 Shea, Samuel E. McCannel Clinic, Minot

Sorenson, A. R. Medical Arts Clinic, Minot
 Sorenson, Roger Medical Arts Clinic, Minot
 Towarnicky, Marvin J. Fessenden
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 Wilson, Herbert J. New Town

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 Valley City
 Macdonald, Neil A. 130 Central Ave. S., Valley City
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 VanHouten, J. 105 Main St. W., Valley City
 Wakefield, Kenneth M. Cooperstown

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 Bodentab, William H. 520 Mandan St., Bismarck
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 Brink, Norvel O. Quain & Ramstad Clinic, Bismarck
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 Icenogle, Grover D. Capitol Bldg., Bismarck
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 Johnson, M. J. E. Quain & Ramstad Clinic, Bismarck
 Johnson, Paul L. Quain & Ramstad Clinic, Bismarck
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 Lommen, M. A. K. Capital City Clinic, Bismarck
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Nugent, Milton E. Quain & Ramstad Clinic, Bismarck
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 Peters, Clifford H. Quain & Ramstad Clinic, Bismarck
 Peterson, Alice H. State Health Dept., Capitol Bldg.,
 Bismarck

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 Schoregge, Robert D. Quain & Ramstad Clinic,
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 Tudor, Robert B. Quain & Ramstad Clinic, Bismarck
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 Vinje, Ralph 405 E. Broadway, Bismarck
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 Waldschmidt, R. H. Quain & Ramstad Clinic, Bismarck
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 Elsworth, John N. DePuy-Sorkness Clinic, Jamestown
 Fandrich, Harry A. Carrington
 Fergusson, Victor D. Edgeley
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 Gronewald, Tula W. State Hospital, Jamestown
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 Hieb, Edwin O. DePuy-Sorkness Clinic, Jamestown
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 Lucy, Robert E. DePuy-Sorkness Clinic, Jamestown
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 Oster, Ellis Ellendale
 Pederson, Thomas E. DePuy-Sorkness Clinic, Jamestown
 Saxvik, Russell O. State Hospital, Jamestown
 Sorkness, Joseph DePuy-Sorkness Clinic, Jamestown
 Swenson, John A. DePuy-Sorkness Clinic, Jamestown
 Tripp, Harry D. Florida State Hospital,
 Chattahoochee, Florida
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 Van der Linde, John M. Medical Arts Clinic, Jamestown
 Van Houten, Richard W. 301 Union Ave., Oakes
 Woodward, Robert S. DePuy-Sorkness Clinic,
 Jamestown
 Young, John H. State Hospital, Jamestown

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 Hagan, Edward J. 411 Main St., Williston
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 Johnson, P. O. C. Watford City
 Keller, John M. Williston Clinic, Williston
 Knobloch, W. H., Jr. Tioga
 Korwin, J. J. 120 Main St., Williston
 Lamal, Andre H. Watford City
 Lund, C. M. Williston Clinic, Williston
 McPhail, C. O. Crosby
 Pile, Duane F. Crosby
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 Skjei, Donald E. Williston Clinic, Williston
 Strinden, Dean R. Harmon Park Clinic, Williston
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 Wright, Willard A. Williston Clinic, Williston

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 Dukart, Ralph J. Dickinson Clinic, Dickinson
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 Gilliland, Robert F. Dickinson Clinic, Dickinson
 Gilsdorf, Amos R. Dickinson Clinic, Dickinson
 Guloien, Hans E. Dickinson Clinic, Dickinson

Gumper, Arnold J. 109 W. 7th St., Dickinson
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 Hankins, Robert E. Mott
 Hill, S. W. Regent
 Hilts, Joseph A. Hettinger
 Knickerbocker, W. J. Hettinger
 Larsen, H. C. 109 W. 7th St., Dickinson
 Maereklein, Otto C. Mott
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 Ordahl, Norman B. 109 W. 7th St., Dickinson
 Raasch, Richard F. Dickinson Clinic, Dickinson
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 Reichert, H. L. 24 W. Villard, Dickinson
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 Smith, O. M. Dickinson
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 Thom, Robert C. Bowman
 Tosky, Julian Hebron

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 Mergens, Daniel N. Hillsboro
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 Vandergon, Keith G. Portland
 Waydeman, H. B. Hunter

TWELFTH ANNUAL MEETING

WOMAN'S AUXILIARY TO THE NORTH DAKOTA STATE MEDICAL ASSOCIATION

Minot, North Dakota, May 3, 4, 5, and 6, 1958

The twelfth annual meeting of the Woman's Auxiliary to the North Dakota State Medical Association was held in the Sky Room, Clarence Parker Hotel, Monday, May 5, 1958, at 10:00 A.M. The meeting was formally opened by Mrs. J. D. Cardy, president.

The pledge of loyalty was given by Mrs. V. J. Fischer, state president-elect, and repeated in unison by the members present.

Invocation was given by Mrs. J. M. Van der Linde, first vice-president.

Mrs. J. D. Cardy introduced our honored guest, Mrs. M. A. Gold, of Butte, Montana, fourth vice-president of the Woman's Auxiliary to the A.M.A.

Mrs. Oliver Uthus, president of the Northwest District, gave the address of welcome. The response was given by Mrs. B. A. Mazur, president of the First District. Mrs. R. W. Rodgers was appointed parliamentarian.

The roll was called by the secretary, Mrs. J. W. Jansonius, and the following were present:

Mrs. J. D. Cardy, president; Mrs. V. J. Fischer, president-elect; Mrs. J. M. Van der Linde, first vice-president; Mrs. R. F. Gilliland, second vice-president; Mrs. R. W. McLean, treasurer; Mrs. J. W. Jansonius, recording secretary; and Mrs. J. J. Stratte, corresponding secretary.

State chairmen: Mrs. M. M. Heffron, press and publicity; Mrs. Robert Hankins, editor; Mrs. Thomas Longmire, public relations; Mrs. Clyde Smith, legislation; Mrs. Henry Kermott, Bulletin; Mrs. R. W. Rodgers, A.M.E.F.; Mrs. Samuel Shea, mental health; Mrs. L. L. Hoopes, safety; Mrs. J. D. Craven, student loan fund; and Mrs. J. H. Mahoney, resolutions.

District presidents: Mrs. B. A. Mazur, Fargo; and Mrs. William Kitto, Minot.

Delegates: Mrs. O. A. Sedlak, Fargo; Mrs. M. H. Poindexter, Fargo; Mrs. D. J. Halliday, Kenmare; Mrs. B. Z. Hordinsky, Minot; Mrs. Dorothy Gilchrist, Devils Lake; Mrs. R. L. McFadden and Mrs. R. D. Nierling, Jamestown; and Mrs. Ralph Mahowald, Grand Forks.

Councillors: Mrs. O. M. DeMouilly, Bismarck; Mrs. Gunder Christianson, Valley City; and Mrs. L. H. Reichert, Dickinson.

Mrs. R. F. Gilliland, second vice-president, gave the "In Memoriam," which is quoted below:

"It is with a great deal of sadness and an equally great sense of loss that we bring to our attention the loss of 1 auxiliary member during the past year. Mrs. A. F. Panek, of Milton and the Grand Forks District Medical Auxiliary, passed away at the age of 71 on April 2, 1958.

"Our sympathy goes out to Dr. A. F. Panek, his son and 2 daughters who survive Mrs. Panek, and also to other members of her family.

"Mrs. Panek had made her home in or near the Milton community since 1906. She married Dr. A. F. Panek in Park River in 1921. Besides her work in the auxiliary, she was a past president of the Milton American Legion Auxiliary and a member of the Royal Neighbor Lodge, St. Clothide's Catholic Church, and the St. Clothide's Altar Society.

"Let us of the Woman's Auxiliary of the North Dakota State Medical Association at this time briefly pause to honor and cherish the memory of our departed friend and member. May we ever be thankful for having had her among us and leaving us the imprint of her personality and greatness."

Motion was made by Mrs. J. M. Van der Linde that the minutes of the eleventh annual meeting be accepted as printed in the October 1957 issue of THE JOURNAL-LANCET.

Mrs. Robert McLean then read the treasurer's report

and asked that all outstanding bills be presented as soon as possible.

Treasurer's Report

Bank balance: September 1957		\$1,321.02
Receipts:		
Dues: 302 members at \$4.00	\$1,208.00	
1 member in arrears	4.00	
Sophomore student loan fund	2,089.46	
Student loan memorial given by Mrs. Mary Wehle	20.00	
Sale of Handhooks—4 at \$.25	1.00	
Convention contribution from North Dakota State Medical Association	100.00	
Registration (Minot convention)		
85 members at \$1.00	85.00	
Convention luncheons (2) and banquet	388.10	
	\$3,895.56	3,895.56
Total receipts		\$5,216.58
Disbursements:		
Dues to National: 302 members at \$1.00	302.00	
1 member in arrears	1.00	
Sophomore student loan fund	2,089.46	
President's expenses	149.60	
Mrs. J. Jansonius (Chicago conference)	85.64	
President elect's expenses (Chicago conference)	99.29	
Newsletter and stationery		
Bismarck Tribune Co.	51.00	
Newsletters: October and December 1957 and February and April 1958	148.51	
Used file cabinet	34.05	
	2,960.55	2,960.55
Standing and special committees:		
Public relations	2.00	
Press and publicity	8.17	
News Views and Cues editor	3.20	
Correspondence secretary	8.61	
Nurse recruitment	3.00	
Treasurer	4.00	
Organization and membership	7.75	
	36.73	36.73
Miscellaneous:		
L. G. Balfour (2 president's pins)	14.66	
Grand Forks Floral (M. Fremming)	10.00	
Bank fees	4.78	
	29.44	29.44
Convention expenses:		
Clarence Parker Hotel:		
Luncheon	85.65	
Pre-convention board meeting	7.85	
Banquet	150.54	
Riverside Lodge, brunch	145.60	
Valkers Green House	117.41	
Maytag Electric	10.20	
Minot Drug Co.	7.71	
Saunders Drug	2.55	
Service Printers	1.53	
Lowes Printing (tickets)	7.91	
Place Cards, favors, etc.	11.60	
Elingson's Department Store	9.13	
	557.68	557.68
Total expenditures		\$3,584.40
Bank balance: June 14, 1958		\$1,732.15

Mrs. J. D. Cardy then presented Dr. R. W. Rodgers, president of the North Dakota State Medical Association. He extended greetings from the medical society, praised us on our achievements, and suggested that we become better informed about Blue Shield and that we have one

meeting at the county level concerning what Blue Shield means in the prevention of accepting socialized medicine. He suggested that we read *Medical Economics* to acquire a better understanding of the social and economic problems facing medicine.

Mrs. J. D. Cardy then told us of the wonderful record of membership in the Student American Medical Association Auxiliary and that our own Student A.M.A. Auxiliary was listed among the first in the nation to receive its charter.

The following reports of state officers and chairmen were then given. The president's report was the first to be presented and is recorded in the September 1958 issue of *THE JOURNAL-LANCET* under Proceedings of the House of Delegates.

Organization and Membership Report 1957-1958

Number of district medical societies in North Dakota: 10.

Number of district medical auxiliaries in North Dakota: 10.

Number of new districts organized during the past year: none.

Total number of paid auxiliary memberships: 290.

Mrs. Mason G. Lawson, past president of the Woman's Auxiliary to the American Medical Association, is our honorary member.

To the district presidents, organization chairmen, and treasurers, who by their diligence and dedication have helped retain our previous membership and added new members, I wish to express my sincere thanks.

Mrs. V. J. FISCHER, Chairman

Program Report

Our theme for 1957-1958 was "Health is a Joint Endeavor." From reports received, it would seem that our North Dakota auxiliaries had worked all year to prove this theme to be correct.

North Dakota participated in the national essay contest for the first time this year. In most districts, the response was excellent and the general consensus of opinion is that a contest such as this is worth backing.

We are well aware of the wide margin of difference between our auxiliaries as to number of members and scope of activity. What an auxiliary with a large membership can do relatively easily along the lines of fund raising or special projects, a smaller membership cannot undertake. Our cancer program is a case in point. Each auxiliary was instructed to work out for itself the extent of its participation. Fargo and Grand Forks are actively engaged in the cancer program, but the smaller auxiliaries, for the most part, are limiting their activities to an offer of assistance to the county society should the need arise.

Our Future Nurses' Clubs now number 3, with Dickinson and Mott joining Jamestown. The Jamestown club now numbers 29 members, 10 of whom plan to enter nurses' training in the fall.

As a state, we are not supporting *Today's Health* magazine. This is the medical profession's own magazine. It contains factual information; it contains educational articles for the layman and deserves better support from us.

With the alarming rise in automobile accidents, our safety program should be made active in each of our auxiliaries, regardless of its size. With such wonderful material as that which has come from our safety chairman, Mrs. Hoopes, setting up this program should prove no problem.

If we plan to keep the government from controlling our medical schools, we must give greater support to the A.M.E.F. and student loan funds. We are supporting them but not strongly enough.

Our membership has dropped from 301 to 290. After some investigation, it appears that most of these lost members are widows of physicians. Since the medical population of the state is growing, we should see an increase in our membership this next year. Extending a personal invitation to these newcomers to attend a meeting of the local auxiliary is most important. We need them and firmly believe they need us.

MRS. J. M. VAN DER LINDE, Chairman

Civil Defense Report

As there were no prepared outlines for state auxiliaries from the national chairman this year, I outlined a program of 3 objectives for our state civil defense program for 1957 and 1958 and sent the following requests to the 10 district civil defense chairmen in November asking for a reply:

1. Contact your local civil defense chairman IMMEDIATELY, giving him your name, address, and telephone number. Inform him of our interest and program in civil defense. Ask him to get in touch with you for any assistance he may need and that you will do everything possible to provide workers from the auxiliary and create the much needed interest. You might also give him a typed list of names, addresses, and telephone numbers of auxiliary members willing and able to work. But, be sure you have the o.k. from each member whose name you are submitting.
2. Urge each member to place a first-aid kit in home and car. Follow up as to the number doing so.
3. Urge each member to take courses in home nursing or first aid. Follow up the same as objective 2.

I received replies from 5 of the district civil defense chairmen. They had all stressed objectives 2 and 3. However, it was impossible to fulfill objective 1 in areas where there is no organized civil defense program.

In localities in which the civil defense program is organized and operating, our auxiliary members are very active and doing their share. But, in areas where there is no organization, our members have found it difficult or impossible to assume responsibilities in civil defense. North Dakota, I feel, for the first time is becoming civil defense conscious, and, within the next few years, the state should be well organized, and our members will then be able to cooperate and accomplish more.

MRS. R. F. GILLILAND, Chairman

Safety Report

The safety program outlined by the National Safety Council has seen little activity in our district auxiliaries this year, but it is hoped that this baby of our family will gather momentum as time goes by.

Definite program materials and lists of available visual aids, though eventually sent out to all the district auxiliaries, were slow to come in at the beginning of the year, and some auxiliaries may have had their year's planning done before these were available. Another reason for the lack of activity in this program may be the fact that North Dakota already requires high school driver education in its schools, although most of that training is confined to the classroom rather than the preferred "behind the wheel" training. Chemical tests for intoxication are legalized procedures in our state, but safety in auto design and equipment still needs the all out promotion of every auxiliary.

The Northwest District had planned a program on safety for their March meeting, but, unfortunately, due to severe weather conditions, that meeting had to be cancelled. At the request of our state president, a sketch on safety was published in our *News, Views, and Cues* at the first of the year to acquaint all members with the new safety program.

In April, Mrs. J. D. Cardy represented our organization at President Eisenhower's Conference on Traffic Safety.

Safety problems were considered so urgent that the President of the United States was requested to form a committee. Surely then, the safety program as outlined by our National Safety Council deserves our support. Now that the safety goals are familiar to all, we should expect each district president for 1958 and 1959 to establish a place for safety in her programming at the very beginning of her fall term.

MRS. LORMAN L. HOOPEES, Chairman

Mrs. Cardy stated how much she enjoyed the Traffic Safety Conference, and that all recommendations would go to the governor.

Today's Health

The following report is based on figures from the Chicago office of *Today's Health* for the purpose of uniform comparison, since a number of counties did not send in reports.

County	Quota	Credits	Percentage
First district (Cass)	65	4	6%
Devils Lake (2nd district)	18	—	—
Grand Forks district	52	32	62%
Kotana	18	23	128%
Northwest district	24	33	137%
Sheyenne Valley	5	—	—
Sixth District (Burleigh)	61	19	31%
Southeastern district (Stark)	23	25	108%
Stutsman	21	8	38%
Trall - Steele	9	—	—
Totals	296	144	48%

Congratulations are heartily given to the 3 districts who reached over a 100 per cent quota: namely, Northwest, Kotana, and Stark.

No recommendation from any district has been received as to how our state can meet its quota for *Today's Health*. However, one possibly may be to incorporate the fee of one subscription into each member's dues. A project of each county for the coming year may also be written to contact all medical and dental personnel in its area for subscriptions.

MRS. NEVILLE W. TURNER, Chairman

Bulletin Report

During the period July 1, 1957, to April 15, 1958, there were 69 subscriptions to the *Bulletin*, which is the official publication of the Woman's Auxiliary to the American Medical Association.

MRS. HENRY KERMOTT, Chairman

Public Relations Report

This year, as in the past, the members of the North Dakota medical auxiliary have been busy in the field of public relations. In every community where there is a doctor, that doctor's wife has been busy in community projects. Many of them are active in the hospital auxiliaries, health drives, Red Cross, and scouting. Several of our members are presidents and committee workers in their P.T.A. groups. One is a member of her local park board. Another active auxiliary member directed a community minstrel show, and still another is a particularly

active volunteer worker in the Red Cross and Gray Ladies.

Teas, fashion shows, and dances were high on the list this year as fund raising projects for the medical student loan fund. Another big project for us this year was the American Association of Physicians and Surgeons essay contest. Our first year in this nationwide contest saw 6 out of 10 districts with essays to submit to the state judges. Several of the remaining districts placed the material in the schools but had no essays completed. The prizes for the winning essays were presented during medical education week.

Contributions to A.M.E.F. have continued, and medical recruitment has received attention with Future Nurses Clubs, teas, and scholarships.

MRS. THOMAS LONGMIRE, Chairman

Mrs. Longmire suggested that any individual contribution to community service should be sent to the Public Relations chairman, such as anything we do at science fairs, in rehabilitation, crippled children's clinics, hospital auxiliaries, and so on.

Press and Publicity Report

The press and publicity work done for our auxiliary during the past year has been accomplished by a committee of 2 members: namely, *News, Views and Cues* editor, Mrs. Robert E. Hankins, of Mott, and your press and publicity chairman.

Through the combined efforts of the editor and the chairman, 4 issues of *News, Views and Cues* were published and appeared in October, December, February, and April. The editor set deadlines; handled correspondence with the councillors regarding district news; received, edited, and condensed the district news; and also planned the general composition of our publication. As chairman, I assisted the editor by conferring by mail and phone with our state president, who is our publications advisor, and by following up these conferences with letters to our state board members to procure the timely messages and cues we wanted to publish to boost or explain certain auxiliary projects. Miscellaneous announcements, profile sketches, and reports not included in the other state chairmen's messages appeared in a column called "Press and Publicity Box." This column was a regular feature of each issue. I also assisted by acting as business and circulation manager.

Pursuant to a proposal made, discussed, and approved at the last fall state board meeting, a printed cover made from the plate used for our printed tenth anniversary issue was added to the *News, Views and Cues*. A three-year supply of covers was purchased, and it is expected that as we thus discontinue the practice of mimeographing our first page on a costly letterhead, with the ensuing and unavoidable waste from mimeograph machine errors, our stationery costs will be reduced.

A mailing list of names and home addresses of the wives of all doctors who are members of the North Dakota State Medical Association, plus those of the new doctors who moved into the state, was kept as up-to-date as possible through conferences with the state medical association office and through correspondence with the district councillors. Copies of this list were sent to our president-elect because she is also organization chairman and to our *News, Views and Cues* editor. Copies can also be given to any other chairmen who need and request them.

News, Views and Cues was mailed to all the in-state doctors' wives on our mailing list and also to the editors of the official auxiliary publications of other states and to our national president, president-elect, national

publications chairman, national executive secretary, and to the A.M.A. Public Relations Department research librarian. This mailing list has steadily increased from 485 names in April 1957 to 517 as of April 1958. Only 59 of these are out-of-state names. Our publication costs us approximately \$.08 per copy.

News from 3 of our districts, Grand Forks, Sixth, and Southwestern, appeared in every issue. All districts have sent in news for at least 2 of the 4 issues; therefore, we have had news from at least 6, and often 8 districts, in each issue. The district councillors and publicity committee members, acting as reporters, kept us informed about district meetings, newcomers, absentees, births, deaths, weddings, travel, our members' accomplishments in community service, and the accomplishments, also, of the medical offspring.

We are indebted to 7 state chairmen; to our state president and president-elect; to Dr. Starcher, president of the University of North Dakota; and to all district presidents for special articles or information contributed to *News, Views and Cues* this year.

The publication of *News, Views and Cues* was not our only publicity project this year. Forty-three mimeographed copies of a news release concerning the AAPS essay contest were prepared at the request of our public relations chairman. This news release was sent directly to 15 newspapers, and the remaining copies were given to district essay contest chairmen to be distributed to other newspapers or interested individuals. Clippings from 14 newspapers have been collected thus far and indicate that many newspapers gave us very adequate cooperation. The district contest chairmen handled the task of writing up the news of their district winners for their local newspapers, and a clipping from the Sunday Fargo Forum indicates that at least First District and Stutsman District procured excellent coverage on the final phase of their district contest.

Our state medical association has no chairman whose duties parallel those of our press and publicity chairman because its executive secretary, Mr. Limond, handles the editing of its newsletter and newspaper publicity and any decisions necessary are made by its committee on public relations. We have done all of our auxiliary publicity work through and with advice from Mr. Limond's office.

In the future, it would be well to observe the suggestion of our editor that if all districts would follow the example of the district which has a volunteer publicity committee of 3 members who call all other members in their district to solicit news, the work of the editor and councillors would be made easier and more effective. Moreover, the possibilities for improving and expanding our publicity are limited only by our need for more members, more money, and more volunteer assistants.

MRS. M. M. HEFFRON, Chairman

Motion was made by Mrs. R. L. McFadden to accept the recommendation that we add at least 1 new member to our press and publicity committee, the new member to be Gladys Arneson. The motion was seconded by Mrs. Clyde Smith and carried.

Motion was made by Mrs. Longmire and seconded by Mrs. Craven that if a district has a sufficient membership, a publicity committee should be established to work with the councillor to obtain news for press and publicity. Motion was carried.

Mental Health Report

Although no definite mental health program has been established by the state medical association this year, an

outline of suggested program activities received from the National Committee on Mental Health was sent to each county auxiliary. Included with this outline was a recommendation regarding the observance of Mental Health Week scheduled for April 27 to May 3, 1958.

The purpose of Mental Health Week is to mobilize public interest and concern in the problem of mental illness and to channel this interest into action with and through the Mental Health Association. The slogan is, "With Your Help, the Mentally Ill Can Come Back." It stresses the hopeful aspect of the problem and urges the public to translate this hope into action in order that thousands of mentally sick people may be restored to their families and communities.

The 4 rallying points for Mental Health Week are: (1) improved care and treatment of mental hospital patients, (2) expanded services for early detection and treatment, (3) adequate rehabilitation for the recovered mental patient, and (4) research.

It is realized that our activities are limited in many of the suggested projects. However, it was recommended that we support Mental Health Week in any of the ways mentioned that are best suited to each district auxiliary.

No record is available regarding how many county auxiliaries had a program at one of their meetings on mental health, since this report is being submitted previous to Mental Health Week.

MRS. SAMUEL E. SHEA, Chairman

Legislation Report

An attitude of watchful waiting toward the Forand bill HR-9467 seems to have been the chief legislative activity of the medical auxiliary since the legislative report of last year. The thinking of the A.M.A. in its fight against the Forand bill has been a reflection of the thinking of Congress and the country as a whole since the introduction of the bill on August 27, 1957.

At the North Central Medical Conference in Minneapolis in November 1957, we were alerted to the dangers of the Forand bill, its provisions, and possible consequences. In brief, the bill would authorize extension of the Social Security Act to provide hospitalization for sixty days and sixty days of nursing home care per year for OASI beneficiaries (retired workers and their beneficiaries and survivors). Financed also is necessary surgical care by American Board of Surgery members or members of the American College of Surgeons. All care must be given in institutions which have entered into an agreement with the government.

Sputnik No. 1 gave us a temporary respite, since it was felt Congress would concentrate on defense and guided missile development. However, now that anti-recession legislation has become more prominent, there is danger that the Forand bill may be brought out of the Ways and Means Committee accompanying the Hill-Burton hospital bill.

The reasons why the Forand bill should not be passed are many, varied, and vital. Some of those considered by the A.M.A. to be most urgent are: (1) it would mean higher taxes and less take home pay; (2) it could bankrupt the social security program; (3) demands by others for similar benefits could lead to total socialized medicine; (4) government regulation of professional fees, wages, and prices, would be introduced in the United States; (5) communities would be threatened with a shortage of hospital beds; (6) many aged persons would become unduly concerned with their health; and (7) beneficiaries under law would be restricted in their choice of hospital and physician.

Antidotes to the Forand bill are being formulated by the A.M.A. to eliminate the necessity of such a bill. Among the points suggested for aging care are: (1) extension of voluntary health insurance to eliminate age limits and (2) development of adequate facilities for care of the aged, such as adding chronic disease wings to hospitals, building nursing homes with FHA help, developing foster homes for aged persons, and forming "Golden Age" clubs with meaningful meetings.

We auxiliary members and our husbands were given a most practical suggestion at a meeting called by Mr. Joseph Miller of the A.M.A. Committee on Hospitals for Legislation Committee members of the N.D.S.M.A. and auxiliary members interested in legislation. At this meeting, Mr. Lyle Limond, executive secretary of the N.D. S.M.A., commented that he had spoken to one of our national congressmen who said he was often asked for favors by the medical profession but that he could not remember when any physician helped him in his campaign. Perhaps the best or only answer to the problem of congressional cooperation is increased political activity on the part of physicians and their wives.

We hope that the meetings of the legislative key men and women will lead to further cooperation in the future. At both the North Central Medical Conference and the special legislation meeting in Bismarck, the importance of auxiliary assistance was mentioned and the impression given that much greater use would be made of the auxiliary in the future.

MRS. CLYDE SMITH, Chairman

Recruitment Report

The recruitment program in North Dakota has continued much the same as last year and includes all allied medical careers.

Films have been shown at schools, Future Nurses' Clubs, hospital guilds, and auxiliary meetings. Information on scholarships has been given to students, P.T.A.'s, hospital guilds, and auxiliary members. Tours have been conducted through hospitals, schools of nursing, and medical laboratories. Career days (or nights) still seem to be the most successful method of recruitment.

Mrs. A. Thompson of Bismarck displayed recruitment literature and talked on nursing at the E.L.C. Luther League Camp.

The chairman prepared 14 posters on health careers, schools of nursing in the state, career days, and so on. These were displayed at the state medical meeting and at the state nurses' convention last October. They are available to districts for display purposes.

One previously organized Future Nurses' Club continues in the state and is a very active group under the capable direction of Mrs. John Young, Jamestown. Two new Future Nurses' Clubs have been formed: 1 in Dickinson under guidance of Mrs. Amos Gilsdorf and 1 in Mott under direction of Mrs. R. Hankins.

October 9 and 10, 1957, Mrs. John Young and the chairman attended the state meeting of the Nurses' Association in Minot and appeared on a panel on Future Nurses' Clubs. The panel was comprised of representatives of the National League for Nursing, State Nurses' Association, Medical Auxiliary, Board of Education, and Future Nurses' Clubs (an advisor and a student member). This was a wonderful opportunity to promote public relations and also to increase the cooperative spirit already existing between the medical auxiliary and the Nurses' Association. It would take all the superlatives of praise to express the attitude of the group after hearing the enthusiastic talks given by Mrs. John Young and the

high School Future Nurses' Club member who accompanied her from Jamestown. This convention also afforded the opportunity for a consultation with Mrs. Irene B. Miller, National League for Nursing field consultant.

As chairman of recruitment, I would like to thank all those who have helped so much in getting the new program underway in North Dakota. Much luck to my successor, and I hope she will enjoy it as much as I.

MRS. E. C. VINJE, Chairman

Historian's Report

The eleventh annual meeting, celebrating the tenth anniversary of the Woman's Auxiliary to the North Dakota State Medical Association, was held at the Gardner Hotel, Fargo, May 26, 27, 28, and 29, 1957.

Mrs. C. A. Arneson presided at the preconvention board and convention meetings. The convention programs are in the Scrapbook and file. All reports of the convention are recorded in the October 1957 issue of THE JOURNAL-LANCET.

Thirty-one members responded to roll call on Monday, May 27. This number increased to 76 in attendance at later meetings. Honored guest speakers were Mrs. Robert Flanders, Manchester, New Hampshire, national president of the Woman's Auxiliary to the American Medical Association; Dr. R. H. Waldschmidt, Bismarck, president of the North Dakota State Medical Association; and Dr. R. W. Rodgers, Dickinson, president-elect.

The Ten Year History of the Woman's Auxiliary was compiled and presented by the historian. Copies are filed in archives.

Memorials were given for Mrs. M. W. Garrison, Minot; Mrs. Frederick O. Gronvold, Fargo; and Mrs. Frank A. Hill, Grand Forks; and a resolution that "our sincere sympathy be extended to their families" was read by Mrs. V. J. Fischer, Minot, first vice-president.

Past presidents were honored at the banquet May 27. An engraved sterling silver compote from the Grand Forks Medical Auxiliary was presented to Mrs. J. D. Cardy upon taking office as president after the luncheon at the Country Club, May 28. Mrs. Callahan, state chairman of the National Polio Foundation, presented a Recognition Award to the state auxiliary. Mrs. C. A. Arneson accepted.

In response to an invitation from the White House, Mrs. J. D. Cardy, president, attended the President's Conference for Traffic Safety for the midwest region at the Sherman Hotel, Chicago, April 1.

Mrs. S. C. Bacheller is a board member of the National Heart Association. She is area chairman of the National Auxiliary Committee on Legislation.

State membership numbers 301.

CLARA D. GERTSON, Historian

Mrs. M. M. Heffron moved that we accept the above reports. Motion was seconded and carried.

Meeting recessed to reconvene at 2:30 P.M.

A luncheon was served Monday, May 5, at 12:30 P.M. in the Tree Top Room, Clarence Parker Hotel. Mrs. V. J. Fischer, state president-elect, presided. She introduced the convention chairmen, Mrs. Samuel Shea and Mrs. A. L. Cameron. She then introduced the officers and honored guest. She presented Dr. O. A. Sedlak, president-elect of the North Dakota State Medical Association. Dr. Sedlak praised us for our many worthwhile projects. He mentioned the importance of the essay contest in molding the minds of the children, and he thought this program should be sponsored. He thought we should stimulate much more interest in A.M.E.F., as the contri-

butions to A.M.E.F. have been very low in our state. He told of the introduction of Blue Shield in 1948 and 1949. He stated that this plan was an important factor in the lives of everyone in the state and nation. He mentioned some of Dr. Gold's remarks about what was happening in Montana. The physicians had lost control of the Blue Shield plan under lay advisors. He mentioned that in Canada after the government had taken over Blue Cross, hospital costs had risen considerably. If the government subsidizes, it, in turn, dictates how the money is to be spent. He stressed the importance of our becoming informed in regard to these prepayment plans. He gave 2 reasons why Blue Cross rates had risen 30 per cent: (1) increased cost of hospital care and increased salaries and (2) because doctors hesitate to make house calls, and send many patients unnecessarily to the hospital. He expressed concern for the disregard some physicians have for the patient's expenses incurred while in the hospital. He stressed the growing consciousness of "man-made diseases" and emphasized the necessity of staying within the limits of the Blue Cross and Blue Shield contracts.

A film "For More Tomorrows" was shown by representatives of Lederle Laboratories, American Cyanamid Company, Pearl River, New York.

The convention reconvened at 2:30 p.m. at the Sky Room of the Clarence Parker Hotel. The meeting was called to order by Mrs. J. D. Cardy, president.

Mrs. Cardy told of the honors Dr. L. H. Landry, Walhalla, was receiving—honorary membership in both the national and state associations. She also mentioned that he had received his fifty-year pin three years ago. She then introduced Mrs. Landry.

The following reports were then read:

American Medical Education Foundation Report

As of April 7, 1958, the sum of \$192 has been contributed for the American Medical Education Foundation in North Dakota. Of this total, \$145 has been donated by 6 of the county auxiliaries and \$47 by private contributions. A total of \$252 had been contributed by May 5, 1958.

Donations from any source will be accepted until May 15, 1958, when all will be tabulated and sent to the A.M.E.F. executive office in Chicago. We hope that by that time all auxiliaries will have contributed.

I would like to make 2 suggestions in this report: (1) that the state auxiliary as such make a yearly contribution to this very important education foundation and (2) that a committee be appointed to select a card, representative of A.M.E.F., to be used by auxiliary members as a Christmas card. The auxiliary would be responsible for the design and the cost of printing such a card, according to information I have received.

May I take this opportunity to thank the auxiliary members who have been county chairmen for A.M.E.F. for their cooperation and service during the two years I have served as state chairman.

ELIZABETH RODGERS, Chairman

Motion was made by Mrs. Reichert and seconded by Mrs. Craven that a committee be appointed to select a card, representative of A.M.E.F., to be used by auxiliary members as a Christmas card, proceeds of which will go into the A.M.E.F. fund. Motion was carried.

Motion was made by Mrs. Smith and seconded by Mrs. Longmire that the proceeds from the Christmas card sales be used as our state contribution rather than taking an amount from the budget. Motion was carried.

Medical Student Loan Fund Report

Below is a list of how much each district contributed.

First, 68 members (dessert fashion show)	\$ 200.00
Kotana, 18 members	100.00
Northwest, 59 members	370.00
Devils Lake, 15 members	60.00
Sixth, 59 members (old book sale)	650.00
Southwest, 25 members	50.00
Sheyenne	
Stutsman, 24 members	125.00
Traill Steele	16.00
Grand Forks, 50 members (rummage sale, dinner dance)	534.46

\$2,105.46

During the past year, 13 loans for a total of \$6,200 were made. There are 25 loans outstanding for a total of \$11,825.73. Cash on hand amounts to \$399.

These figures are as of February 19, 1958.

MRS. MARGARET R. CRAVEN, Chairman

A letter was read from President Stareher suggesting that we extend our student loan fund to cover freshmen in medical and even pre-medical school.

Motion was made by Mrs. Van der Linde and seconded by Mrs. Mazur that we leave our student loan fund as such. Motion was carried.

American Association of Physicians and Surgeons Essay Contest Report

Mrs. Longmire suggested that every district appoint an area chairman so that all would be represented in the state contest. The question arose concerning the money for the prize winners and whether the bill was to be submitted to the public relations chairman of the medical society. We discussed whether we should take on the project as a state activity but still appeal to the association for the prizes.

Motion was made by Mrs. Longmire and seconded by Mrs. Reichert that the auxiliary cooperate with the state medical society, sponsor of the A.A.P.S. essay contest. Motion was carried.

Under Revisions, Mrs. Cardy stated that we could do very little until fall when national had completed its revisions. She stated that counsellors should still be elected at district levels.

Auxiliary President's Report — First District

First District Medical Auxiliary has 68 members, the same number as last year.

Three meetings have been held this year. The first was a dinner meeting at the Gardner Hotel, October 29, 1957. Mrs. Leslie Sachow, local chairman of the Cancer Society, spoke on the work of the local Cancer Society and the part our auxiliary can take in its program. The second meeting, January 29, 1958, was a luncheon meeting at the Frederick-Martin Hotel. Our state president, Mrs. James Cardy, was our honored guest and speaker. Mrs. J. J. Stratte, state corresponding secretary, was also a guest. The third meeting, March 25, 1958, was a dinner meeting at the Gardner Hotel. The cancer education film, "Horizons of Hope," was shown. Our fourth and last meeting will be a luncheon meeting on April 30, 1958. The speaker will talk on civil defense, and election of officers will be held.

This year, our district had 5 main projects. Our first consisted of sponsoring the A.A.P.S. essay contest for high school students in our district. Mrs. John Bond was a capable and enthusiastic chairman for our initial participation in this national program. Letters, posters, and bibliographies were sent to the 38 high schools in our district. Local prizes were offered. While the student response was disappointing, we felt that it was a start

on a project of value to the medical association in the field of public relations. Our district medical society contributed financially toward our expenses and prize money.

Our second project was our cancer education program. With Mrs. H. A. Norum working as chairman, the program chairman of every woman's organization in all the churches was asked to plan a program for her group showing an educational cancer film. Meeting time and place were recorded and given to the Cancer Society.

Our third project was our annual benefit dessert and style show, held February 14 at the Elks' Club. The hard work and excellent planning of the committee, with Mrs. L. E. Wold and Mrs. L. G. Pray as co-chairman, were well worth the effort. Some of our own members modeled. We were thus able to send \$200 to the student loan fund and \$75 to A.M.E.F.

For our fourth project, we sponsored a booth on health careers at the annual high school science fair on March 28 and 29. With the help of St. Luke's Hospital and St. John's Hospital, demonstrations, exhibits, and literature were given students and parents on careers in x-ray, medical technology, nursing, and dietetics. Mrs. Lee Christoferson was chairman.

Our fifth project will be a tea for high school girls interested in nursing careers and will be followed by tours of St. John's and St. Luke's hospitals.

Our recruitment chairman, Mrs. Calvin Fercho, is planning the tea for the end of April to tie in with Career Day at the high school.

Three of these projects were new undertakings this year and may well be continuing projects.

Upon investigation, we found that the public schools, fire department, and police department have such a complete and well organized safety program that our endeavors in this field would be superfluous.

Plans for Mental Health Week have not been made as yet.

The fact that we have only 6 subscriptions to *Today's Health* is disappointing.

Individual members have worked on the United Fund Drive, March of Dimes, Heart Fund, Cancer Society, Tuberculosis, Christmas Seals, Red Cross, and the Volunteer Service Bureau.

First District officers and chairmen, all from Fargo, are:

Mrs. C. M. Hunter, 1434 S. 6th St.; Mrs. George Thompson, 421 S. 14th St.; Mrs. M. H. Poindexter, 1350 S. 9th St.; Mrs. D. T. Lindsay, 1505 S. 11th St.; Mrs. John H. Bond, 516 S. 13th St.; Mrs. H. A. Norum, 1533 S. 6th St.; Mrs. Calvin Fercho, 1502 S. 10th St.; Mrs. G. U. Ivers, 1106 S. 10th St.; Mrs. Robert J. Ulmer, 1433 S. 12th St.; Mrs. B. C. Corbus, 1257 N. 4th St.; Mrs. W. E. G. Lancaster, 1332 N. 5th St.; Mrs. L. G. Pray, 1701 S. 8th St.; Mrs. L. E. Wold, 1708 S. 9th St.; and Mrs. Lee Christoferson, 1307 S. 6th St.

Mrs. B. A. MAZUR, President

Auxiliary President's Report—Second District

The auxiliary to the Devils Lake District Medical Society held 7 meetings this past year 1957 and 1958. In spite of the fact that members are from widely scattered points, we had a very enjoyable year. Our paid-up members totaled 15. Our meetings were social and held at The Ranch in Devils Lake.

Our auxiliary subscribed 100 per cent to the *Bulletin* and many members subscribe to *Today's Health*. We donated to the student loan fund. The auxiliary matched the \$25 given by the Devils Lake Association toward prizes for the essay contest.

Our members have been active in local community projects, such as Red Cross, park boards, hospital auxiliaries, P.T.A., Cub Scouts, Brownies and church groups.

Mrs. M. R. GILCHRIST, President

Auxiliary President's Report—Third District

The members of the Grand Forks District Medical Auxiliary are very proud of our state president, Mrs. James Cardy, a member of our district.

Our auxiliary for the current year has 50 members. In April, we were saddened by the loss of one of our members, Mrs. A. F. Panek, of Milton. She will be greatly missed by all who knew her.

We have had 4 meetings during the year 1957 and 1958. Our first meeting, a luncheon, was held at the Ryan Hotel, October 17. Since it was our first of the season, it was a "get acquainted" meeting. New and prospective members as well as out-of-town members were introduced. A special effort had been made to encourage the attendance of out-of-town members. Miss Carol Braund, soprano soloist, sang during the afternoon. The second meeting was held at the Dacotah Hotel on November 20. Dr. Ralph Mahowald gave a most interesting and instructive talk on civil defense. A discussion period followed. On January 15, the members of the Medical Students' Wives Club were our guests at the Ryan Hotel. We were pleased to have Mrs. James Cardy, our able state president, as our speaker. She spoke on the vital parts of our auxiliary program and on current legislation. It was a very interesting and informative talk. The medical students' wives joined us in a question and answer period after the program. Our last meeting was held March 16 at the Hotel Dacotah. Annual reports were given, and officers for the coming year were elected. Guests of honor were Mrs. James Cardy, and 2 members who are leaving soon, Mrs. Robert Turner and Mrs. Jack Revere.

Each month one of the auxiliary members offers the use of her home to the Medical Students' Wives Club for their meetings. This year the club voted in favor of joining the Woman's auxiliary to the Student American Medical Association. Their affiliation with this national organization is planned for the coming year. We sponsor this group.

A total of \$534 was sent to the medical student loan fund. This sum was obtained from profits of our annual medical student loan fund dinner dance held at the new Grand Forks Armory in February, 2 rummage sales held at the Y.M.C.A. in September and April, and 2 memorial contributions to the fund by the medical school personnel in memory of Dr. Walter Wasdahl's father who passed away in September and to honor the memory of his mother-in-law who passed away in March.

The auxiliary sent two \$5 memorial contributions to the A.M.E.F. fund to honor the memory of Dr. H. M. Waldren, of Drayton, and Mrs. A. F. Panek, of Milton.

As in past years, our members have taken an active part in community activities. Many of our members are busy in the St. Michael's and Deaconess Hospital auxiliaries and various church groups. Some are active Red Cross workers, and many participate in the boy and girl scout programs as well as P.T.A., Y.W.C.A., and other organizations.

Representatives of the Grand Forks District Medical Auxiliary served as hostesses and guides when the new Rehabilitation Center at the University was opened for public inspection on Saturday afternoon January 25.

Our *Today's Health* chairman has reported 27 subscriptions while our *Bulletin* chairman has reported 9 subscriptions.

The following officers were elected for 1958 and 1959: Mrs. T. Q. Benson, president; Mrs. Wallace Nelson, vice-president; Mrs. Nelson A. Youngs, secretary; and Mrs. Louis B. Silverman, treasurer.

I am grateful to the members of this auxiliary for the loyal cooperation which has been given to me at all times during the past year.

MRS. E. L. GRINNELL, President

Auxiliary President's Report — Fourth District

Membership in the Northwest District Auxiliary for the current year numbers 34 members and 2 honorary members. The Northwest District uses the "package deal" of \$10 to cover local, state, and national dues and subscriptions to *Today's Health* and the *Bulletin*.

The auxiliary will have had 4 regular meetings, 2 dinners, and 2 luncheons, by the close of the business year in April. At the April meeting, election of officers will be held and convention plans discussed.

Our fall meeting was devoted to packaging and distributing bags for our second "Paper in a Poke" sale for student loan funds. Over 550 bags were packed and sold, netting \$370. This project keeps everyone busy in October and November and keeps the auxiliary members in constant contact with one another.

Mrs. J. D. Cardy, our state president, visited us in January at a dinner meeting where she urged all members to write our congressmen opposing bill HR-9467. Mrs. Cardy also instituted in the Northwest District the practice of giving our pledge in opening meetings. She also pointed out that each auxiliary should choose projects which are most workable in a particular district and which would be of most interest to them.

Convention plans were formed during our March meeting. The auxiliary contributed \$50 to the A.M.E.F. this year.

We were late in starting on the essay contest but found it would have been accepted enthusiastically if the students had had more time. Therefore, our same chairman has consented to take over this new project next year, and we're confident much better results will be achieved.

Members of the auxiliary have served on both the St. Joseph and Trinity hospital guilds and also assisted in the annual Shamrock Tea at Trinity Hospital. Many members have been active as individuals in community projects, such as Mothers' March on Polio, Red Cross drive, and Girl and Boy Scout organizations. The auxiliary was asked if our members would start the polio coffee party drive, and a number did so.

MRS. O. S. UTHUS, President

Fifth District Report

As you know, our group has been inactive during the past year. For various reasons, so few doctors' wives were able to attend meetings that we decided to become inactive until the situation changed. We hope we can function before too long as we miss the pleasure of being together.

Mrs. Neil MacDonald has continued in the capacity of president and I as councillor so that we have kept in contact with the state organization.

Best wishes for a successful convention.

MRS. GUNDER CHRISTIANSON, Councillor

Auxiliary President's Report — Sixth District

The Sixth District Medical Auxiliary has 61 members this year.

During the year, we have had 3 dinner meetings. Our first meeting was held in October at the Prince Hotel. Dr. Alice Peterson, director of Maternal and Child Health for the State Health Department, spoke to us. At our second meeting in December, members sang Christmas carols and were entertained by vocal solos

and readings. Our third meeting was held on February 26. We were delighted to have Mrs. Cardy as our special guest that evening. We will have an election of officers at our fourth meeting in April.

This year we voted to make raising money for the student loan fund an individual responsibility. Each member had the choice of donating a minimum of \$10 or raising the money herself. As of April 1 we have \$630 in the fund. A small amount of this was raised by raffling off the centerpieces at our meetings and by a small used book sale.

As always, our members have participated in many civic activities. Many members were hostesses and guests at a series of polio coffee parties. Mrs. Roy Gregware and Mrs. Robert Tudor acted as hostesses at a tea given by Mrs. John Davis for the legislators' wives. Mrs. John Cartwright worked for the Burleigh County Tuberculosis X-ray Unit. Several members are volunteer workers at the Bismarck Filter Center. Mrs. Paul Johnson served as chairman of the Heart Fund Drive. We have also participated in the Red Cross drive and the March of Dimes. Other members are active in the Bismarck and St. Alexius hospital auxiliaries, PTA groups, church organizations, volunteer election work, civic music clubs, Boy and Girl Scout work, Community Players, and Garden Clubs.

A check for \$25 was sent to A.M.E.F. We plan to raise this amount next year.

Thirty-two members subscribe to the *Bulletin* and 9 members have subscriptions for *Today's Health*.

We sponsored the A.A.P.S. essay contest. Mrs. Robert Kling and Mrs. O. V. Lindelow served as chairmen for this project.

Sixth District is proud of our 5 state chairmen: Mrs. Clyde Smith, legislation; Mrs. C. A. Arneson, nominating; Mrs. M. M. Heffron, press and publicity; Mrs. Edmond Vinje, recruitment; and Mrs. C. J. Baumgartner, finance.

Sixth District officers, all from Bismarck are:

President, Mrs. Robert Tudor, 714 Ave. C. West; vice-president, Mrs. R. D. Schoregge, 1420 Ave. E.; secretary, Mrs. J. W. Cleary, 104 Seminole; and treasurer, Mrs. Phillip Dahl, 1111 S. Highland Acres.

Chairmen, all from Bismarck with the exception of Mrs. DeMouilly of Flasher are:

A.M.E.F. and Bulletin, Mrs. Phillip Dahl, 1111 S. Highland Acres; civil defense and safety, Mrs. Carl Baumgartner, 615 Washington St.; community health, Mrs. R. W. Henderson, 1028 4th St.; *Today's Health*, Mrs. C. H. Peters, 805 Griffin; press and publicity, Mrs. M. M. Heffron, 320 Ave. B. West; dinner arrangements, Mrs. C. R. Montz, 315 Park Ave.; Mrs. H. H. Smeenk, 1107 Ave. A.; and Mrs. R. Berg, 219 Ave. B. West; legislation, Mrs. C. L. Smith, 622 Raymond; mental health, Mrs. J. T. Cartwright, 111 S. Highland Acres; nurse recruitment, Mrs. Norvel Brink, 212 Ave. F. West; organization and membership, Mrs. R. D. Schoregge, 1420 Ave. E.; program, Mrs. A. M. Thompson, 610 Ave. A. East; public relations, Mrs. Robert Kling, 1414 Hanaford; and Mrs. O. Lindelow, 831 Crescent Lane; community council, Mrs. Charles Arneson, 714 N. 2nd St.; councillor, Mrs. O. M. DeMouilly; historian, Mrs. R. Gregware, 1107 S. Highland Acres; parliamentary, Mrs. H. M. Berg, 214 Ave. A. West; and student loan fund, Mrs. Carl Baumgartner, 615 Washington.

The wonderful cooperation of my officers and chairmen has made my year as president a very happy one.

MRS. ROBERT TUDOR, President

Auxiliary President's Report — Seventh District

The Stutsman County Medical Auxiliary has had an active, productive year. One of our regular projects is, and has been for some years, to provide food and good useable clothing for a needy family at Christmas. This year we took care of 2 families: 1 in the county and 1 in the city.

The Future Nurses' Club has grown. About 10 of our members will go into training in the fall of this year.

We feel we have, under the guidance and leadership of Mrs. John Young, provided an interesting and educational program for these people.

As a group, our 24 members have been active in key positions in Red Cross, first aid, United Fund, and P.T.A. Mrs. Thomas Pederson was the president for the P.T.A. World Prayer Day. Mrs. Robert Woodward investigated and reported on milk sanitation in our community when it was called to our attention that some questions had arisen on the subject. We learned that we had a Grade A milk shed. Mrs. Young displayed some of her work in the art exhibits in Bismarck and Grand Forks. We have been hostesses at a birthday party for the patients at the State Hospital and plan to take an active part in the Cancer Caravan when the time arises.

If we knew the total number of entrants, we might not be quite so smug, but not knowing allows us to crow a bit when we state that one of our Jamestown youngsters, Carol Mergler, placed first in the county in the essay contest and also won first place in the state.

Our total contribution to the A.M.E.F. is a low \$10, but we have given a total of \$125 to the student loan fund. Since *Today's Health* and *Bulletin* chairman is out of town, I have no accurate report on subscriptions.

We were fortunate enough to have Nan Cardy, our state president, as our honored guest at our Christmas party. Our interest in legislation, student loan fund, and A.M.E.F. has been greatly increased by her interesting and informative speech on these subjects.

We have had 2 dinner meetings so far this year. Our final meeting will be held on April 11, at which time our officers for 1958 and 1959 will be elected.

MRS. JOHN M. VAN DER LINDE, President

Auxiliary President's Report — Eighth District

The Kotana Medical Auxiliary met on November 15, 1957, with the president Mrs. Gordon Ellis, presiding. The officers for the year were: president, Mrs. Gordon Ellis; vice-president, Mrs. Joe Craven; and secretary-treasurer, Mrs. John Keller.

Election of officers was held. The new officers are as follows: president, Mrs. John Keller; vice-president, Mrs. Andrew Sathe; and secretary-treasurer, Mrs. Chester Borrud.

Chairmen are: *Today's Health*, Mrs. Willard Wright; public relations, Mrs. Dean Strinden; program, Mrs. H. Charles Walker; civilian defense, Mrs. Justin Korwin; membership, Mrs. Donald Skjei; legislation, Mrs. Duane Pile; and councillor, Mrs. John Craven.

Dues were paid for the total membership of 18 members.

The Kotana Medical Auxiliary met at the Williston Clinic on December 22, 1957 for a dinner meeting. It was decided at that time to meet 4 times a year in the future. Total subscriptions for *Today's Health* are 22. The amount sent to the A.M.E.F. was \$10. The amount sent to the student loan fund was \$100.

The Kotana Medical Society and the Kotana Medical Auxiliary met at the Elks' Club on March 24, 1958, for dinner. Dr. and Mrs. Cardy were our guests. After dinner, the auxiliary members adjourned to the home of Mrs. Joe Craven for a business meeting. Our guest speaker for the evening was Mrs. Cardy, who enlightened us on many aspects of the auxiliary as a unit.

MRS. JOHN M. KELLER, President

Auxiliary President's Report — Traill-Steele District

As in past years, the Traill-Steele Medical Auxiliary has found it difficult to organize programs due to the distances between members. We have 8 members living

in 5 different towns. Therefore, we feel it is much better to coordinate our activities with those of our communities, and each member of our district is active in the civic affairs of her town. These activities include civil defense, cancer drives, safety programs, mental health, and so on.

Our meetings are held 4 times a year and are of a purely social nature. We contribute a small donation to the student loan fund, and, although we are an inactive group, we are definitely interested in the work of the State Medical Auxiliary.

MRS. R. W. McLEAN, President

Auxiliary President's Report — Tenth District

The Woman's Auxiliary to the Southwestern District Medical Association held 5 dinner meetings during the year of 1957 and 1958.

The first meeting was held at the home of Mrs. C. R. Dukart, at which time a report was made on the state convention by our delegate, Mrs. Lawrence H. Reichert.

At our October meeting, a motion was made and carried that the subscription price of *Today's Health* be deducted from the dues of each member. Our secretary-treasurer, Mrs. Richard F. Raasch, was instructed to send a check to the local *Today's Health* chairman, Mrs. Keith G. Foster, who forwarded it to the Chicago office.

Coffee and cookies donated by the auxiliary were served by a committee consisting of Mrs. Hans E. Gulioen, Mrs. Lawrence H. Reichert and Mrs. C. R. Dukart to the North Dakota Crippled Children's Clinic, which was held here in September. This was done through the efforts of Mrs. Robert F. Gilliland, who was a director for the Crippled Children's Society.

A holiday dinner was given by Mrs. Richard F. Raasch at her home for the auxiliary members in December, after which a business meeting was held. Mrs. Donald J. Reichert, president, in the absence of Mrs. Arnold J. Gumper, our public relations chairman, distributed A.A.P.S. essay contest packets to out-of-town members: Mrs. Walter Knickerbocker of Hettinger, Mrs. Robert Thom of Bowman, Mrs. A. A. Curiskis of Elgin, Mrs. Walter Hannewald of Richardton, and Mrs. Robert E. Hankins of Mott. Mrs. Gumper had previously given packets to Central High School of Dickinson. Efforts were made to promote participation in the contest, and at our February meeting, the judges were selected. Miss Jane Looney of Dickinson's Central High School was our winner and has been awarded a prize of \$25, which was donated by the Southwestern District Medical Society. The essay was forwarded by Mrs. Gumper to the state public relations chairman, Mrs. L. T. Longmire. We hope with the experience gained this year, we will be able to sponsor a larger group of contestants next year.

In December, Mrs. Richard F. Raasch reported for Mrs. Amos R. Gilsdorf, who had been working with the Future Nurses' Club and with Sister Margaret of St. Joseph's Hospital in Dickinson, that Sister Margaret was interested in having the auxiliary sponsor the newly formed Future Nurses' Club of Dickinson. A committee was appointed consisting of Mrs. Amos Gilsdorf, Mrs. Ralph Dukart, and Mrs. Keith G. Foster to discuss details with Sister Margaret. Mrs. Gilsdorf reported at our February meeting, which was held at the home of Mrs. Donald J. Reichert, on what would be expected of us if we sponsored the Future Nurses' Club. A motion was then made and carried that we do so. At the March meeting, Mrs. Gilsdorf reported that the Future Nurses' Club would have a discussion panel on television station KDIX, Dickinson, on March 24 at 6:30 p.m. The panel

consisted of Miss JoLin Rodgers, a registered nurse, and daughter of Dr. and Mrs. R. W. Rodgers; Mr. J. A. O'Brien, moderator; and 3 members of the Future Nurses' Club. The club is now taking a Red Cross first-aid course and making plans to affiliate with the national Future Nurses' Club. They will receive their pins at a tea which is to be given in May at the home of Mrs. Donald Reichert. Much credit is due Mrs. Amos Gilsdorf for the hours she has spent with this group and also for assisting Sister Margaret at St. Joseph's Hospital.

It was suggested by Mrs. Lawrence Reichert that we help develop a coffee service at the hospital for visitors. Several sponsors are to be contacted about the possibility of purchasing a coffee machine. We hope to do something in turn for each hospital in our district.

We have 25 members in the Southwestern District Medical Auxiliary for 1957 and 1958. Letters were written by Mrs. Donald J. Reichert to 2 eligible women, asking them to join the auxiliary. A reply from one stated that if her husband remains in our district, she will join.

In March, a dinner was given at the home of Mrs. Arnold J. Gumper with Mrs. R. W. Rodgers as co-hostess, after which a meeting was held. Officers for 1958 and 1959 were elected as follows: Mrs. Richard F. Raasch, president; Mrs. Donald J. Reichert, vice-president; Mrs. R. W. Rodgers, secretary-treasurer; Mrs. Robert E. Hankins, delegate to the state convention; and Mrs. R. W. Rodgers, alternate delegate. Mrs. Lawrence H. Reichert is councillor for the auxiliary. Mrs. Robert Hankins is editor for *News, Views and Cues* and North Dakota Newsletter, and Mrs. Robert F. Gilliland is state second vice-president.

A financial report made by Mrs. Richard F. Raasch, secretary-treasurer, in March listed dues paid to:

National and state associations	\$100.00
American Medical Education Fund	25.00
Student Loan Fund	50.00
<i>Today's Health</i> , 25 subscriptions	37.50

At this time it was agreed that we keep a larger balance in the treasury for expenses or projects which might develop before dues are again collected. Fifteen dollars was also given A.M.E.F. for sympathy cards.

MRS. DONALD J. REICHERT, President

Resolution Report

I.
Be it resolved: That this convention of the Woman's Auxiliary to the North Dakota State Medical Association extend to Mrs. J. D. Cardy its thanks and sincere appreciation for the great service which she has rendered to that group.

II.
Be it resolved: That the Woman's Auxiliary to the North Dakota State Medical Association express grateful appreciation and thanks to the City of Minot; to the Medical Society of Northwest District; to the auxiliary convention chairmen; to managers and staffs of the hotels; to members of the press, radio, and television; to Mr. Lyle Limond, executive secretary of the North Dakota State Medical Association, and his staff; to Dr. R. W. Rodgers, past president; to Mrs. M. A. Gold, Butte, Montana, national fourth vice-president of the Woman's Auxiliary to the American Medical Association; and to all other groups who have contributed to the success of the convention and to the comfort and entertainment of the delegates.

III.
Be it resolved: That the Woman's Auxiliary to the North Dakota State Medical Association express appreciation

for the support and cooperation received from all persons, organizations, and agencies who contributed to the success of its program and that of its state and district auxiliaries during the past year.

MRS. J. H. MAHONEY, Chairman

Motion was made by Mrs. Fischer and carried that we adopt the resolution.

Under election of delegates to the A.M.A., June 23 to 27, San Francisco, the president was given power to appoint delegates.

Nominating Committee Report — 1958-1959

President, Mrs. V. J. Fischer, Minot; president-elect, Mrs. John Van der Linde, Jamestown; first vice-president, Mrs. Robert F. Gilliland, Dickinson; second vice-president, Mrs. R. W. McLean, Hillsboro; recording-secretary, Mrs. John Janssonius, Jamestown; treasurer, Mrs. Carl J. Baumgartner, Bismarck.

MRS. CHARLES A. ARNESON, Chairman

MRS. SWANSON

MRS. SORKNESS

MRS. GAMMEL

Mrs. Cardy then asked for nominations from the floor. As there were none, she declared the above persons duly elected and instructed the secretary to so record this in the minutes.

Mrs. R. McLean then read the following proposed budget for 1958 and 1959.

Proposed Budget — 1958 - 1959

Proposed expenditures:

President:		
National convention	\$ 265.00	
Chicago conference	117.50	
Discretionary fund	100.00	
Miscellaneous fund	25.00	
	<hr/>	
	\$ 507.50	\$ 507.50
President elect:		
Chicago conference	117.50	
Standing and special committees	60.00	
News, Views and Cues	175.00	
Stationery	22.00	
Convention expenses	260.00	
File cabinet	75.00	
Miscellaneous	40.00	
	<hr/>	
	749.50	749.50
		<hr/>
		\$1,257.00

MRS. C. J. BAUMGARTNER
MRS. R. W. McLEAN
MRS. REUBEN WALDSCHMIDT
MRS. H. L. KERMOTT, JR.
MRS. ERNEST LARSON

Mrs. R. W. Rodgers moved that we accept the proposed budget as read.

Meeting adjourned.

A delightful banquet was held Monday, May 5 at 6:30 p.m. in the Silver Saddle Room of the Clarence Parker Hotel, with Mrs. Oliver Uthus, Northwest District president, presiding. Mrs. Uthus introduced the convention chairmen, Mrs. Shea and Mrs. Cameron, and the honored guest and speaker, Mrs. M. A. Gold, of Butte, Montana, fourth vice-president of the Woman's Auxiliary to the American Medical Association. Mrs. Gold stressed the importance of our appointing chairmen to work closely with the doctors who hold parallel positions and especially someone to work with a key man on the same legislative program. She advised us to publicize our scholarships and loans in the recruitment of nurses and allied positions. She gave the 3-point action program for traffic safety to be carried out at the community level. Recommendations made by the A.M.A.

committee were: (1) a driver training course in every high school, (2) shop for safety when you buy a car, and (3) work toward legislation to keep the drinking driver off the highway. She quoted from Dr. Allman on the concrete results of our labor in the auxiliary. She said, "Don't tell us how good we are; just tell us what to do." She stated that since there were 2½ million more women than men in the United States, we had the balance of power in our hands and how we used it was up to us. She mentioned the force in this country that was greater than the atomic bomb—public sentiment. She stated that if we started to talk about the same thing at the same time, we could form public opinion that political parties could not ignore or overlook. She quoted statistics in regard to our time-saving devices. She said that formerly it took five and one-half hours to prepare a meal for a family of 4; it now takes one hour and thirty-five minutes, a gain of three hours a day. She said that we not only had the natural ability to mold public opinion but that we had the time and advised us to use our influence.

Our last session was held Tuesday, May 6, at 11:00 A.M. at the Riverside Lodge. Mrs. Samuel Shea, convention chairman, presided. A lovely brunch was served. Prizes were awarded and a gift was presented to Mrs. Gold. Mrs. Gold installed the new officers, Mrs. Ralph Wallin was our vocalist. Mrs. J. D. Cardy then presented the gavel to the new president, Mrs. V. J. Fischer.

Postconvention Minutes

Mrs. V. J. Fischer called the meeting to order. She asked that the members of the medical society with positions comparable to ours be contacted for guidance and suggestions as to what could be accomplished. She asked that the treasurer's books be closed in June and audited at the fall board meeting. She announced that Mrs. Waldschmidt was our new finance chairman.

Mrs. J. D. Cardy stressed the point that the nominating committee should function as 4 people. The following were elected to serve on the nominating committee with Mrs. J. D. Cardy: Mrs. Joel Swanson, Mrs. Joseph Sorkness, and Mrs. R. T. Gammell. Mrs. Cardy suggested that the nominating committee should plan a meeting.

Motion was made by Mrs. Cardy and seconded by Mrs. Longmire that the new member of the five-member revolving finance committee be appointed by the president. Motion carried. It was decided the fifth member of the Student Loan Committee should be appointed by the president also. Mrs. V. J. Fischer asked that all reports be sent in triplicate: 1 to the president, 1 to the secretary, and 1 for the files.

It was suggested that the following names be submitted to Sally Wold, A.M.E.F. chairman, for help in designing the A.M.E.F. Christmas card: Mrs. Marlin Johnson, Mrs. Buckingham, Mrs. Pierce, and Mrs. John Young.

Mrs. Halliday asked that we attempt to establish a Student Nurses' Scholarship. Motion was made by Mrs. Kermott and seconded by Mrs. Van der Linde that our recruitment chairman, Mrs. Young, study and investigate existing scholarships and present this at our fall board meeting. Motion carried.

It was decided that delegates to the A.M.A. be selected from those who planned to attend. Those chosen were Mrs. T. E. Pederson and Mrs. J. W. Jansonius.

After discussion, the group felt that the essay contest plans should be left to the decision of Mrs. Longmire. Meeting adjourned.

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Foreword

Although most physicians think of migraine as headache, it is of real interest that in the paper entitled, "Unusual Manifestations of Migraine," Dr. John F. Briggs and Dr. James Bellomo have discussed the manifestations of migraine when the pain occurs in areas other than in the head.

JOHN S. LUNDY, M.D.

Unusual Manifestations of Migraine

JOHN F. BRIGGS, M.D., and JAMES BELLOMO, M.D.

St. Paul, Minnesota

THE CLASSICAL MIGRAINE SEIZURE is easily recognized. Unfortunately, emphasis has been placed so frequently on the "classical" features that many of the atypical and equivalent forms of migraine are not recognized. The mechanism producing migraine still remains incomplete, but sufficient evidence indicates that the attack is initiated by cerebral vascular constriction followed then by vascular dilatation. In addition, there is a strong hereditary element, and the person afflicted with migraine has a personality that seeks and creates stress and strains and yet, at the same time, is unable to respond to the stress and strains. We have been impressed by the number of patients who have atypical migraine as well as true migraine seizures. For this reason, we wish to record some of our observations in individuals suffering from migraine.

Many types of aura have been described in association with migraine. Some of these have been most unique and, at times, so disturbing to the patient that he seldom relates them to the attending physician. The feeling of body dissociation or alteration in body size occasionally initiates the seizure. The feeling either of euphoria or pronounced depression may be the aura in many patients. Auditory hallucinations are very unusual. In one patient, each seizure of migraine is heralded by "I hear a trumpet playing in the distance, and it always seems to play the William Tell Overture." The patient did not recognize the significance of this auditory phenomena until a number of migraine seizures

followed this auditory hallucination. The patient stated that when she first discussed this particular problem with her physician and family, they suspected that she was mentally disturbed. It wasn't until later that she had sufficient courage to point out that she knew that the auditory phenomena was followed by a classical migraine. A physician related to us that he has had attacks of migraine heralded by the sound of a jet bomber appearing first in the distance and then the roaring noise of the jet increasing in severity as it seemingly passed over his head. This was followed by an attack of migraine.

Many neurologic phenomena are associated with migraine. Hemiplegia is occasionally associated with migraine. A student nurse who has been a victim of migraine for many years had left hemiplegia in association with her migraine attacks. These were so focal in nature that they suggested the possibility of a cerebral lesion, but repeated studies failed to confirm this impression. Secondary Raynaud's phenomena has also been found in association with migraine. A physician who suffered from migraine noted that the seizures were always associated with a Raynaud's phenomena in his left hand. Numbness and tingling and other paresthesias are not uncommon during a migraine attack.

Preordial migraine occurs frequently. In these patients, the cephalalgia is many times less prominent than the cardiac symptoms. Patients may exhibit chest pain, palpitation, extrasystolic arrhythmia, and paroxysmal tachycardia in association with the seizure. Failing to recognize the disturbance as part of the migraine phenomena, the diagnosis of coronary disease has been made erroneously in a number of these patients.

JOHN F. BRIGGS is associate professor of clinical medicine at the University of Minnesota. JAMES BELLOMO is a St. Paul internist.

Paroxysmal attacks of vertigo associated with the cephalalgia as a migraine equivalent occur frequently after the menopause. These may also occur in men past middle age. A careful history of these paroxysmal attacks reveals that the patient has experienced severe migraine in the past or that the present attacks are similar to those that he had with the atypical migraine but that now only an occasional, mild headache is associated with the vertigo. This is often so mild that the patient fails to recognize the headache because of the distress from his dizziness.

Periodic vomiting in children may be a manifestation of migraine. Vomiting may occur in infancy or as the child grows older. In one instance, the periodic attacks of vomiting and abdominal pain in a child were so severe that the child required hospitalization. Careful questioning of the child revealed that the attack started with a headache only and was followed later by abdominal pain, nausea, and vomiting. The mother suffered from severe migraine, and other members of the family had histories of migraine. The child was later seen with typical attacks of migraine.

Pain in the back of the neck and occipital area is not an uncommon manifestation of migraine. This occipital myalgia may be so severe that it is impossible for the patient to move his head. After the cephalalgia ceases, the pain in the neck and the muscles of the scalp may remain or may be associated with paresthesia in this area. The periodic occurrence of the cervical phenomena without headache or in conjunction with a mild headache often leads to an erroneous diagnosis.

Torticollis in association with migraine has also been recognized. One patient who suffered from classical migraine frequently had a severe torticollis occur with the cephalalgia. In addition, she had periodic torticollis with only a mild headache, but all the other classical manifestations of the migraine were present.

Abdominal migraine has also been recognized. In these cases, the abdominal symptoms may surpass and overshadow the cephalalgia or both may be present to the same degree. Occasionally, the same patient may have a cephalalgic form of migraine and, on other occasions, the abdominal form of migraine. One of our patients has classical migraine associated with epigastric pain, which is more severe in the upper right quadrant, radiating to the back and mimicking cholecystic disease. These seizures were typical of a gallbladder colic. After careful study and re-evaluation and despite the presence of normal

cholecystograms, a cholecystectomy was performed. The gallbladder proved to be normal. Following the removal of the gallbladder, the patient still had the identical type of pain in association with her migraine attacks. We have seen this happen on a number of occasions, and we call this a cholecystic type of abdominal migraine.

A physician who had suffered from classical migraine for years had an unusual type of abdominal migraine. In the classical seizure, the patient found that the attack was always initiated by a euphoric aura. During this time, he could carry out endless amounts of work and had tremendous psychomotor activity. When this occurred, his wife knew he would suffer from a headache the next day. After this aura and psychomotor activity, the patient would be seized with a violent cephalalgia with all of the associated phenomena of a migraine attack. On other occasions, he had periodic attacks of very severe epigastric pain with projectile vomiting. He had had many gastrointestinal studies done to find the cause of this recurring epigastric distress. It was found that both the patient and his wife recognized that these abdominal attacks were associated with a peculiar aura. Before these attacks occurred, the patient was seized with a peculiar appetite. He became euphoric, and his psychomotor activities increased. He then ate such unusual meals as pickled pigs feet, pickled herring with potatoes, and salt mackerel with boiled potatoes. Following the ingestion of these unusual food combinations, the patient was seized by terrific abdominal pains with projectile vomiting and occasionally diarrhea. When seen in one of these seizures, he was acutely ill and, interestingly enough, had his room darkened. He stated, "When I have these attacks, the light hurts my eyes." When questioned as to whether or not he had a headache, he said, "Yes, I have a headache, but I think it comes from the effort to vomit." On further questioning, each one of these seizures was found to be associated with the headache, and, at times, he had a typical migraine cephalalgia with the attack. Once the association was pointed out to him, he recognized that the abdominal attack represented an unusual form of his migraine.

Diarrhea may also be a manifestation of migraine. A railroad worker had typical cephalalgic seizures which were associated with periodic diarrhea. At other times, the periodic diarrhea played a prominent role, and the cephalalgia was mild or absent.

Migraine may also be associated with epilepsy. In some patients, the use of the anticonvulsive agents decreases the number of migraine seizures. A man who has suffered from classical migraine for years has, in addition, episodes of grand mal and petit mal epilepsy. It is interesting to note that the migraine seizures are decreased in frequency while he is taking anticonvulsive agents. A woman who has had classical migraine for years also suffers from petit mal and grand mal epilepsy. She, too, has a noticeable decrease in the migraine seizures while on anticonvulsive agents.

A disease which may be confused with migraine is caused by cerebral angiomas. In these patients, headaches recur which are not typical of migraine, and there is an associated focal type of epilepsy. Furthermore, there may be pressure symptoms from the aneurysm or angiomas or from the effects of bleeding from such a tumor.

A married woman who suffered from classical migraine also suffered from typical grand mal and petit mal forms of epilepsy. At no time was there any evidence of focal epilepsy. A very severe headache developed, which she recognized as being different from migraine and also different from any other headache that she had had. The pain increased in severity so that she entered the hospital and, under symptomatic treatment by her family physician, she recovered and was about to go home when she suddenly became paralyzed. Physical examination reveal-

ed a subarachnoid hemorrhage, and, at autopsy, a ruptured aneurysm was found in the circle of Willis. Investigations before her death failed to show the presence of any intracranial lesion, and at no time did this patient fit the "angiomata epileptic syndrome."

Renal migraine also occurs. In these patients, the associated symptom with the cephalalgia is that of a renal colic. Another married woman who suffered from classical migraine had typical renal colic pain associated with her migraine attacks. On occasions, the renal colic phenomena predominated, and the cephalalgia was of minor importance. Careful urologic investigation failed to reveal any evidence of renal disease. A man suffering from migraine also had renal phenomena with the cephalalgia. Pain developed in the flank, radiated down into the testicle and the groin, and was associated with polyuria. Repeated urologic investigations failed to reveal any disturbance in the urinary system. Occasionally, the attacks occurred in the absence of the cephalalgia.

CONCLUSION

Emphasis is placed on the fact that in addition to the classical seizure, many variants of migraine occur. At times, these equivalents may predominate, thus overshadowing the cephalalgia. At other times, the cephalalgia may be absent and the variant present. Our personal experience with these variants has been related.

Book Reviews on Pain

PHYSICS FOR THE ANAESTHETIST INCLUDING A SECTION ON EXPLOSIONS, by ROBERT MACINTOSH, F.F.A.R.C.S., M.D., Nuffield professor of anaesthetics, University of Oxford; WILLIAM W. MUSHIN, F.F.A.R.C.S., professor of anaesthetics, Welsh National School of Medicine, University of Wales; H. G. EPSTEIN, Ph.D., F.F.A.R.C.S., first assistant, Nuffield department of anaesthetics, University of Oxford, ed. 2, 1958. Springfield, Illinois: Charles C Thomas, 443 pages. \$15.50.

In the preface to the current edition, the authors write, among other things: "It has often been said that teaching is the best way of learning. Twelve years ago anaesthetists visiting this department often propounded questions involving the application of physics to our specialty. When we didn't know the answers we found it a helpful discipline to clarify our minds by referring to the proper sources. Our difficulty often turned out to be reconciling scientific accuracy with simplicity and brevity. A statement accurate enough to satisfy the scientist might be too ponderous for the clinician whose previous training

had not prepared him to digest such unpalatable fare. Eventually we felt pen should be put to paper, and in this book we set out to increase the anaesthetist's appetite for knowledge by making the diet more attractive."

The objectives of the work thus defined have been accomplished. This book has been much needed for a long time. It helps to fill in some important lacunae that existed for many years in the field of basic sciences as related to anesthesiology. Pharmacology and chemistry, in this peculiar respect, have been covered rather well in previous writings and now physics is presented adequately in the volume at hand. This book will not be read easily by those who have been out of school a long time, but the subject can scarcely be more simplified than it has been in this book. The many illustrations, brief text, and excellent selection of examples contribute to mastery of the subject by the reader. This is really necessary reading for anyone intimately concerned with anesthesiology. It is indeed compulsory reading for any anesthesiologist who wishes to do research if he plans to employ physical means.

JOHN S. LUNDY, M.D.

Current Literature on Pain

THE PREVENTION, RECOGNITION AND TREATMENT OF POSTOPERATIVE ATELECTASIS, by P. A. CLAYTON: *J. Am. A. Nurse Anesthetists* 24:254-258, 1956.

"The most common of all postoperative pulmonary complications is atelectasis . . . Prevention of the disease is always better than treatment if prevention is possible . . . The skill of the anesthetist is of primary importance as compared to the type of agent used . . .

"If atelectasis is not recognized as an immediate complication of the surgery and anesthetic, it characteristically appears in about forty-eight hours. Pain is not common but a desire to cough is. Evidence of oxygen want is usually present as is some degree of cyanosis, shortness of breath, labored respirations, and an increase in pulse. Any patient with a temperature of 101° or above must be considered as a suspect. The most important sign is asymmetric chest movement. Usually, with such a patient, if treated immediately, there is not too much trouble and results are good. With the patient turned with the affected side up, a little pounding on the chest over the involved area may be enough to dislodge the mucus, cause it to move, and thus stimulate a coughing spell. Deep breathing with a good cough may do the trick. If the patient is uncooperative and refuses to cough due to pain, supporting the incision with one hand and the other placed behind the back makes it easier. Sometimes a visit just after a hypo will find the patient feeling more comfortable, and he will be more in the mood to cooperate. If these efforts are not sufficient, carbon dioxide-oxygen inhalations may stimulate breathing sufficiently to move the mucus slightly and thus set up a coughing spell. It may be necessary to resort to all these maneuvers. If the patient is semicomatose and unable to cooperate, it may be necessary to pass a suction catheter into the trachea, which always sets up coughing and at the same time the secretions can be sucked out."

From JOHN S. LUNDY and FLORENCE A. McQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 38. Copyright by JOHN S. LUNDY.

CIRCULATORY RESPONSES DURING ANESTHESIA OF PATIENTS ON RAUWOLFIA THERAPY, by C. S. COAKLEY, SEYMOUR ALPERT, and J. S. BOLING: *J.A.M.A.* 161:1143-1144, 1956.

"The purpose of this study is to point out the possible hazard present in cases of hypertensive surgical patients on Rauwolfia therapy . . . All types of surgery and both major and minor procedures were performed on this group of patients. The criterion used to evaluate significant circulatory changes during anesthesia for patients receiving one of the reserpine drugs is blood pressure depression greater than 40 mm. Hg associated with a pulse rate falling below 60 per minute, or 20 per minute below the preoperative rate. The hypotension and bradycardia occurred during induction of anesthesia.

"Forty surgical patients received one of the Rauwolfia alkaloids: 24 showed no significant circulatory changes; 15 had circulatory changes fulfilling the criterion outlined above; and in 1 the blood pressure level and pulse rate fell after premedication. Thus, in a total of 40 patients,

16 had severe circulatory depressions not associated with the surgical procedure but following premedication and use of anesthetics . . .

"Electrocardiographic tracings have shown ischemic myocardial changes . . . Patients on Rauwolfia therapy who are to undergo elective surgery should not receive this drug for two weeks prior to the surgical procedure. The hazards of removing the antihypertensive and tranquilizing effects of these drugs must be considered before discontinuing therapy prior to a surgical procedure. Emergency surgery on these patients may be safely carried out by using vagal blocking drugs to prevent and treat vagal circulatory responses."

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NITROUS OXIDE, TRICHLOROETHYLENE, AND ETHER: A BALANCED ANESTHESIA IN OBSTETRICS, by L. N. CHEELEY: *Anesth. & Analg.* 35: 422-424, 1956.

"In the hospital in which the author works (Oil City Hospital, Oil City, Pa.), the anesthesia gas machines do not have carbon dioxide absorption units on them, and the 'Trilene' and the ether vaporizers are attached in series to the gas line. The ether jar is attached directly to the gas line and is of the 'wick' type. Next in line is the 'Trilene' jar which contains no wick. The 'Trilene' is vaporized by the passage of gases over the surface of the 'Trilene.' Thus, we have two anesthetic agents, 'Trilene' and nitrous oxide, both of which, when used properly, are safe agents and have very little effect on the newborn infant. There is only one quality lacking, i. e., potency. To add potency to this mixture and to give greater controllability and muscular relaxation, it seems logical to add ether vapor . . .

"To avoid postpartum nausea and vomiting, using the nitrous oxide-oxygen-trichloroethylene and ether technique, the ether is shut off as soon as the baby is born . . . The advantages of this technique may be summarized thus: 1. Ready controllability of depth of anesthesia. 2. Anesthetic agents in the dosages prescribed are relatively nontoxic and are readily eliminated. The postpartum recovery period is shortened. 3. The baby is little affected by anesthetic agents. 4. Nausea and vomiting are minimal."

From JOHN S. LUNDY and FLORENCE A. McQUILLEN: *Anesthesia Abstracts*. Minneapolis: Burgess Publishing Company, 1957, vol. 45, page 37. Copyright by JOHN S. LUNDY.

PHYSIOLOGY OF THE ADRENAL GLAND, by J. H. BURN: *Brit. J. Anaesth.* 28:459-469, 1956.

"In the course of evolution, chromaffin tissue and the tissue of the adrenal cortex, formerly two separate organs, have been brought together into one organ, the adrenal gland . . . The active principles of the cortex which are found in the adrenal vein in man are believed to be there; namely, hydrocortisone, corticosterone, and aldosterone. These are hormones with a steroid structure, much more complicated than that of noradrenalin and adrenalin. The first, hydrocortisone, represents 80 per cent, the second represents 20 per cent, and the third less than 1 per cent of the active substances liberated . . .

"These different substances all share the property of prolonging the life of young adrenalectomized rats when exposed to cold. This property depends on the rapid formation of carbohydrate from protein and is known as glucocorticoid activity Another property possessed by the adrenal cortex is that of controlling the excretion of sodium by the kidney

"Another property of the cortical hormones is that when released in the blood they cause a fall in the number of eosinophil cells in circulation. Since the physiological significance of this change is uncertain, this property is mentioned only because it may also be used to compare the different hormones of the adrenal cortex. . . . Aldosterone has from one-quarter to one-half the potency of cortisone, and cortisone is equal in action to hydrocortisone

"The observations of Hench, Kendall, Slocumb, and Polley (1949) showed that cortisone had a powerful effect in restoring the mobility of the joints in rheumatoid arthritis. This is generally regarded as an effect due to the dissolution of inflammatory exudate and to the disappearance of fibrous tissue around the joints and is considered as one aspect of the action of cortisone in suppressing inflammatory processes. There seems to be no doubt that cortisone and hydrocortisone when given in large doses can lower the resistance of both animals and men to certain forms of infection

"Other effects of cortisone and of hydrocortisone have definite clinical value in suppressing various phenomena which may be grouped as allergic The hormones of the adrenal cortex are released when the pituitary gland is removed, but the rate of secretion then remains constant Much greater amounts of the cortical hormones are liberated in conditions of stress

"Under conditions of stress we may note that the hormone of the adrenal cortex and of the adrenal medulla support one another. Thus hydrocortisone facilitates the conversion of protein to carbohydrate, while adrenalin breaks down glycogen to glucose. Again it has been demonstrated that cortisone (and therefore hydrocortisone) is required to maintain the blood-pressure-raising action of noradrenalin

"There are several steroid substances capable of diminishing the symptoms of cortical deficiency The substance which offers the greatest promise, however, is aldosterone, which removes all the symptoms of adrenal insufficiency; namely, fatigue, nausea, anorexia, sleepiness, depression, and the dyspnoea which occurs on making an effort

"Besides diseases due to cortical deficiency, there are some due to hormone excess Adrenalin is formed from noradrenalin by the substitution of a $-CH_3$ group for hydrogen in the $-NH_2$ group The importance of the change from noradrenalin is very great. In the first place, noradrenalin has little or no power to cause a discharge of ACTH from the anterior lobe, and without adrenalin the power to augment secretion of cortical

hormone in times of stress would be greatly reduced. In the second place, adrenalin is far more efficient to discharge the functions required in time of stress than is noradrenalin

"A further difference between the two amines is in their vascular action. Adrenalin causes vasoconstriction in the skin and in the intestinal region, but in moderate amounts it causes dilatation of the muscle vessels The fact that noradrenalin is liberated by splanchnic stimulation has given rise to speculation whether it has a special function not shared by adrenalin There is evidence that stimulation of the hypothalamus at one point causes the release of mainly noradrenalin from the gland, whereas stimulation at a different point causes the release of a large amount of adrenalin as well Furthermore, there appear to be cells in the adrenal medulla which contain noradrenalin and others which contain adrenalin

"Of the working of the adrenal gland, much remains to be discovered. We have no idea of the mechanism of the anti-allergic action and of the anti-inflammatory action of the cortical hormones, and of course very little idea of how these hormones are acting when they convert protein to carbohydrate or when they absorb sodium in the kidney tubules."

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RESPIRATORY ADJUSTMENTS TO INCREASES IN EXTERNAL DEAD SPACE, by G. B. CLAPPISON and W. K. HAMILTON: *Anesthesiology* 17:643-647, 1956.

"Although it has been a matter of common knowledge that increases in external dead space would cause an increase in tidal and minute volumes in subjects able to increase their ventilation, the quantitative aspects of those increases, particularly with quite small dead space increments, have not been well delineated. This investigation was undertaken to determine the effects of such increases in external dead space on certain respiratory functions Normal adult males were used as subjects

"Dead space increases of about 125 ml. added to a 'minimum' external dead space of 40 cc. cause statistically significant changes in tidal and minute volume and end-expiratory pCO_2 in unanesthetized normal subjects under quiet, resting conditions. This indicates that even in unmedicated normal subjects, the adjustments to increased dead space, particularly in diagnostic and research apparatus, should be considered thoroughly since it is conceivable that less than optimum accuracy might be obtained with increases in dead space formerly considered insignificant."

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BOOK REVIEWS

(Continued from page 424)

and promotional activities and initiate and help carry on a national campaign to eradicate bovine tuberculosis. In 1934, he was appointed general manager of the National Livestock Loss Prevention Board and held this position until his retirement in 1951.

In this volume, Dr. Smith tells how the bovine type of tubercle bacillus entered the United States and spread to such serious proportions. His first experience with this disease was in 1894 as a student at Michigan Agricultural College, which is now Michigan State University, where pioneer work with the tuberculin test was being done. He observed this test to be so specific that wherever he worked thereafter, he insisted upon its use. He spent a great deal of time in Washington testifying before legislative committees on the importance of adequate appropriations for the eradication of tuberculosis among animals. Indeed, he played an exceedingly important role in procuring the first large federal appropriation for this purpose.

Despite the intense opposition to the tuberculosis eradication program by uninformed, misinformed, or selfish individuals, Dr. Smith worked unceasingly to see that accurate information reached owners of cattle, legislators, and all others concerned.

Tuberculin testing of cattle was placed on a county-wide basis. The reactors were removed, and periodic testing was done until all of the 3,150 counties of the United States received the modified accredited rating. This rating was awarded the counties as fast as the incidence of tuberculin reactors reached 0.5 per cent or less. Ever since, periodic tuberculin testing has been continued with the eradication of the bovine type of tubercle bacillus as the goal. This has been attained in many places where no animal reacts to the tuberculin test. However, in the nation as a whole, about 0.15 per cent of the animals react. There is evidence that many of these acquire infections from owners, farm hands, and other human contacts.

This book also calls attention to how the control of tuberculosis among cattle reduced the disease among people. Prior to 1917, many people acquired tuberculosis from cattle. Evidence indicates that an important block of the incapacitating and killing disease of that period among people was due to the bovine type of tubercle bacillus.

In 1917, Dr. John A. Kiernan,

then chief of the Division of Tuberculosis Eradication of the United States Bureau of Animal Industry, was asked how long it would take to eradicate tuberculosis on a nationwide scale. He wisely answered that there was no ground upon which a reasonable estimate could be made. He said, "All one can do is to make a guess as to the time, and it is my belief that if this nation succeeds in eradicating tuberculosis in fifty years, it will be one of the greatest heritages our successors will have handed down to them." If the eradication methods of the past are continued and intensified, it seems probable that by 1967, the bovine type of tuberculosis will have been eradicated from cattle. However, unless drastic action is taken to administer the tuberculin test to people everywhere and examine and keep reactors under observation, as Dr. Smith recommends, there will still be tuberculin reactors among cattle.

The remaining problem to be solved both among animals and people will be the responsibility of members of 4-H clubs and Future Farmers of America to whom this book is so wisely dedicated as well as every present and future American youth. The book is an accurate step by step account of a method applied with such success that it has been designated man's greatest victory over tuberculosis. With modifications, it can be as effective in eradicating tuberculosis from people.

Physicians everywhere can contribute significantly in the program of eradication of all types of pathogenic tubercle bacilli by contacting leaders of 4-H clubs and Future Farmers of America in an endeavor to place Dr. Smith's book in possession of every member.

J. ARTHUR MYERS, M.D.

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The Diagnosis and Treatment of Postural Defects, by WINTHROP M. PHELPS, M.D., R. J. H. KIPHUTH, and CHARLES W. GOFF, M.D., 1956. Springfield, Illinois: Charles C Thomas, 190 pages. \$6.50.

This book deals with the fundamentals of posture, its evolution in the human race, its development from infancy to adulthood, and the various factors which effect this development. The factors stressed are environment, disease, congenital abnormalities, and abnormal stresses and strains. The authors define normal posture for various age groups and discuss the normal and abnormal variations in each group. The

diagnosis and treatment of the more common abnormalities are included. The general principals of body mechanics are presented, which include a thorough but practical discussion of the anatomy and mechanics of movement of the various joints and regional components of the body together with the effect on the center of gravity and posture with each movement. The various methods used in postural examination are explained. These include direct physical examination and measurement, silhouettegraphic studies, and postural analysis by photometric means using full body photographs in four views and aluminum markers attached to key bony landmarks.

The final chapter deals with corrective exercises for strengthening various muscles and muscle groups. This gives detailed but easily followed instructions in corrective exercises and indications for their use.

This book was written for school physicians, athletic coaches, physical educators, and parents interested in the growth and development of children. It is well written. The pictures and illustrations are descriptive. The terminology used can be readily understood by both the professional and lay reader.

JOHN H. MOE, M.D.

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Kaposi's Sarcoma: Multiple Idiopathic Hemorrhagic Sarcoma, by SAMUEL M. BLUEFARB, M.D., edited by Arthur C. Curtis, M.D., 1957. No. 308, American Lecture Series, monograph in Bannerstone Division of American Lectures in Dermatology. Springfield, Illinois: Charles C Thomas; Oxford, England: Blackwell Scientific Publications, Ltd.; Toronto, Canada: Ryerson Press, 171 pages. \$5.50.

This compact monograph is an excellent review of all the currently available knowledge on this unusual and interesting disorder. Following brief chapters on history and descriptive terms, the author discusses various etiologic factors and pathology, including theories regarding pathogenesis. A considerable portion of the book is devoted to clinical manifestations, internal as well as cutaneous. Diagnosis, differential diagnosis, prognosis, and various therapeutic methods are all adequately covered. The bibliography is extensive and particularly complete. This well written, nicely illustrated volume can be recommended to anyone interested in this subject.

ELMER M. HILL, M.D.

The Journal Lancet

Introduction to Series on Communicable Diseases

J. ARTHUR MYERS, M.D.

THE PAPER ON "Scarlet Fever" by Dr. L. G. Pray in this issue is the first of a long series of articles on communicable diseases to be published in THE JOURNAL-LANCET. Progress has been made in diagnosis, treatment, and prevention of many of these diseases. However, one fact stands in bold relief. Namely, none has been eradicated, and many of them, although markedly reduced in prevalence and destructiveness, remain constant threats to the citizenry of every community. One of the objects of this series is to keep these diseases before our readers so that they will be on the alert should they appear in their communities. The accompanying table shows number of cases and deaths in Minnesota at twenty-year intervals since 1916.

Although efficacious smallpox vaccine has been available since 1796, I have personally observed an epidemic causing serious illness in a large number of persons, 300 of whom died. Smallpox remains one of the scourges of mankind with over 400,000 cases occurring each year among the world's citizenry. I have resided in a rural community where previously well-documented diphtheria epidemics resulted in deaths of 25 to 50 per cent of school children. There a family monument testifies that all of

the 9 children died from this disease within a period of three weeks. Over recent decades, periods of years have passed there without 1 case having been reported. However, in other years, cases have appeared. Even now, more than 1,000 cases and several hundred deaths from diphtheria occur annually in the United States.

Illness and death from smallpox and diphtheria, which are completely preventable, are due to such factors as lack of information, economic situations, opposition to preventive measures by cultists, and public complacency.

In the United States alone, 3,000,000 persons are said to suffer annually from contagious diseases (exclusive of the common cold).

No communicable disease of human beings or animals will be eradicated as long as its causative organism exists. Therefore, there must be no relaxation of constant vigilance and health education. Health workers and educators in all categories must present information everywhere, then repeat and repeat and repeat. Important facts to date are presented in this series of papers which, if employed judiciously and unsparingly, will markedly reduce illness and death everywhere from these diseases.

Reported Cases and Deaths of Selected Communicable Diseases

(Courtesy Minnesota Department of Health)

	1916		1936		1956	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Diphtheria	2,502	170	427	17	44	4
Measles	9,596	273	8,024	23	1,334	2
Poliomyelitis	912	105	37	4	150	6
Scarlet fever	4,003	117	10,556	111	975	0
Smallpox	1,256	1	397	0	0	0
Tuberculosis*	5,280	2,400	3,483	963	1,282	115
Typhoid fever	1,055	129	120	14	37	0
Whooping cough	919	234	1,705	34	123	1

*December 1956 current register 8,386 cases. Estimated 25 per cent of total population harboring bacilli = 750,000.

Scarlet Fever

LAURENCE G. PRAY, M.D.

Fargo, North Dakota

SCARLET FEVER is an acute infectious disease characterized by sudden onset of sore throat and fever, with a subsequent erythematous rash often followed by desquamation. It is caused by the group A hemolytic streptococcus and, like other streptococcal infections, may be complicated by cervical adenitis, otitis media, mastoiditis, sinusitis, and later by rheumatic fever or acute hemorrhagic nephritis. It is primarily a childhood disease, the majority of cases occurring between the ages of 3 and 8, with 75 per cent in children under 10 years of age. It is uncommon in infants under 1 year of age, although cases have been recognized even during the first year of life. It occurs in all parts of the world but is most common in the cooler temperate zones during the winter and spring months. Except in rare instances, it is endemic in a community, with sporadic cases breaking out at scattered points. Scarlet fever has diminished in severity in recent years, but it is still to be respected and avoided.

HISTORY

According to Topp, Angrassias of Palermo in about 1560 is credited with being the first person to give a clear description of scarlet fever. Thomas Sydenham was one of the first to describe the disease and differentiate it from measles and other infectious diseases. This famous seventeenth century English physician considered scarlet fever a minor infection but later appreciated its more serious nature. Others who recognized and described scarlet fever were Senert and Döring of Germany, who lived at about the same time as Sydenham. It is doubtful

whether scarlet fever was known at the time of Hippocrates or during the Middle Ages.

ETIOLOGY

The streptococcus is now recognized to be the cause of scarlet fever. This discovery was due to the work of the Dicks and others, who reproduced the disease in human volunteers from cultures of hemolytic streptococci. Lancefield has classified the streptococcus into 12 or 14 serologic groups on the basis of group C specific antigen, a carbohydrate fraction extracted from the streptococcus. Group A is the most pathogenic for man, causing 90 to 95 per cent of human hemolytic streptococcal infections. Groups C and D organisms occasionally cause human infection but tend to be less severe than group A infections. Group A has been subdivided into more than 40 types on the basis of type specific M antigen. The M antigen, a protein, is of clinical importance because the antibodies produced against it cause type specific immunity to develop in the patient.

There are other antigens produced by the group A hemolytic streptococcus: namely, the erythrogenic toxin, streptolysin O, fibrinolysin (streptokinase), and hyaluronidase. The erythrogenic toxin causes the rash of scarlet fever in addition to other toxic manifestations of that disease. Streptolysin O is produced by most group A strains and causes hemolysis of red cells. Fibrinolysin may break down fibrin barriers and result in a more rapid spread of streptococci in the tissues. Hyaluronidase increases the absorption and spread of fluids in the body tissues and may also tend to diffuse the organisms and toxins throughout the body. Antibodies against streptolysin O, as evidenced by a high antistreptolysin titer, are indicative of a recent streptococcal in-

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fection. This test is a standard laboratory procedure. Antistreptokinase and antihyaluronidase in the blood serum have a similar significance. Antibody against the C antigen can also be demonstrated in the laboratory and is also indicative of a recent streptococcal infection.

Scarlet fever and other streptococcal infections are usually spread by droplets from the nose and throat of an individual who is carrying the organism either as an ill patient or as a carrier. The organisms may be coughed, sneezed, or exhaled into the air and, hence, directly into the nose and throat of a nearby healthy person, causing him to contract the disease, or the organisms may lodge in bed clothing, dust, or lint and then be carried into the respiratory passages of individuals who have had no close contact with the patient or carrier. The same may be said for objects handled by an infected individual and also for infected food handlers or dairy workers. The difficulty of reducing the incidence of streptococcal infections is evident, since it is estimated that 20 per cent of children and 8 per cent of the total population are carriers during the winter months.

CLINICAL COURSE

Symptoms of scarlet fever begin after an incubation period of two to seven days, with five days the usual limit of incubation. Occasional cases have been reported eight to ten days following contact, but these cases are not common.

The onset is characterized by sore throat and fever, which may be mild or severe. In severe cases, the temperature rises rapidly to 103 to 104° F. and is accompanied by an extremely sore throat, headache, and often nausea and vomiting. In the milder cases, more common at the present time, the sore throat and fever and other symptoms are less acute so that the physician is often not called until the fever and sore throat have persisted for two or three days or until the rash appears and causes concern.

The rash comes out in twelve to thirty-six hours after the onset of other symptoms. Occasionally, the rash does not appear for three to five days, but this prolonged time interval is indeed rare. Characteristically, the rash is a fine, diffuse, erythematous eruption appearing much like a sunburn. It may be quite smooth, or it may be granular due to swelling and elevation of the sebaceous follicles. It may be scattered and mild in some cases and thus be confused with German measles. The rash occurs on the neck, trunk, and extremities but does not usually involve the face. The face is flushed with a circumoral pallor. In milder cases, the rash is most

pronounced in the axillae, groins, neck, and chest. It is often accentuated in the body folds, particularly the cubital folds. These accentuated lines are called Pastia's lines. The rash blanches on pressure with the fingertips, the color quickly returning to the blanched areas when the pressure is released. The rash may last only a day or two in mild cases or as long as seven days in cases in which the rash is severe. Desquamation of the rash may or may not take place, and the absence of desquamation does not rule out the diagnosis of scarlet fever. The amount of desquamation is in direct proportion to the severity of the rash as a rule. Desquamation usually begins in about a week to ten days after the rash first appears. It is most constant on the tips of the toes and fingers but, in some cases, peels off in large strips over the entire surface of the hands and feet and in fine and large patches on the body. It may last for a week to two weeks or even longer.

The tongue has a heavy, grayish white coating on the first day with fiery redness appearing at the tips and margins of the tongue on the first or second day. The coating clears from the tip backward over a five- to seven-day period, leaving a bright red tongue with prominent papillae, the characteristic strawberry tongue. The strawberry appearance subsides in another three or four days. The throat has an acute diffuse inflammation. By the second day, there are usually flecks of white exudate on the tonsils, which may become larger, patchy, and thick. The exudate is not usually present in mild cases. The anterior pillars and soft palate have a typical redness and blush, and there are at least a few small, bright red hemorrhagic spots on the soft palate during the first two or three days. The anterior cervical lymph glands are moderately enlarged, firm, and tender during the acute stage. Scarlet fever occasionally starts in an infected surgical or traumatic wound. In such cases, the characteristic changes in the throat, tongue, and cervical glands do not take place.

The body temperature may remain elevated only two or three days or a week or longer, depending on the severity of the case and the type of treatment administered. The pulse rate is rapid during the febrile illness. The respiratory rate is increased in proportion to the temperature and toxicity. After the temperature subsides to normal, there is a convalescent period of a week or ten days in which the patient's appetite and energy return to normal. Young children tend to have a shorter convalescent period than older children and adults.

Relapses have been known to occur during the

third or fourth week of the disease, with recurrence of sore throat, fever, and rash. In my experience, however, such cases have occurred only in contagious disease hospitals in which patients with scarlet fever were exposed to one another. Although typing of group A streptococci was not done in these cases, reinfection was probably not caused by the original type of streptococcus and had taken place before erythrogenic antitoxin had developed in appreciable quantity.

Recurrence of scarlet fever years after the original infection is also known to occur in rare instances. Some authorities dispute the validity of such recurrences, but, on clinical grounds, there is no doubt that they do take place, probably on the basis of low levels or loss of erythrogenic antitoxin.

LABORATORY FINDINGS

The leukocyte count is elevated to 12,000 to 20,000 cells, with a shift to the polymorphonuclear leukocytes and band cells. After the first three or four days, a characteristic eosinophilia of 5 to 10 per cent occurs. The changes in the white blood cell count gradually disappear as clinical symptoms subside. There is ordinarily no anemia even though the streptococcus is hemolytic; anemia can be a factor in severe or complicated cases. The sedimentation rate, antistreptolysin titer, and C reactive protein all become elevated during the acute or convalescent stage of the disease and gradually return to normal after four to six weeks. Antibodies also develop against streptokinase and hyaluronidase. No laboratory tests except a urinalysis are necessary in the ordinary case of scarlet fever but may be significant in cases of doubtful diagnosis or helpful as a prognostic aid.

The urine often contains moderately increased albumin during the acute febrile illness together with a few red blood cells per high-powered field. These findings disappear with defervescence. The urine is always tested during the second or third week of the disease to rule out the possibility of hemorrhagic nephritis as a complication.

The Dick test indicates susceptibility to scarlet fever when positive. A patient becomes negative to the Dick test on the third day of illness. The test is very seldom used, but should be kept in mind and applied in doubtful cases. It consists of the intradermal injection of standardized streptococcus toxin containing 1 skin test dose in 0.1 cc. A positive reaction is shown by an area of erythema measuring at least 1 cm. in diameter after twenty-four hours.

The Schultz-Charlton test is another diagnostic

test for scarlet fever and consists of injecting .2 cc. of scarlet fever antitoxin or .5 cc. of convalescent or immune serum intradermally into the rash. This causes the rash to blanch in four to twenty-four hours for several centimeters around the injection site.

COMPLICATIONS

Complications are much less frequent now than formerly, probably due both to the milder form of scarlet fever now being seen and to the prompt and effective use of antibiotics in treating the disease. However, they still occur and must be watched for and guarded against.

The most common complication is acute otitis media, as the streptococcus has a pronounced tendency to invade the middle ears. If not adequately treated, otitis media may, in turn, invade adjacent structures, causing mastoiditis, brain abscess, lateral sinus thrombosis, and meningitis. Sinusitis is not uncommon and occurs when the infection spreads from the nose into the adjoining sinuses. Streptococci may occasionally invade the larynx, trachea, and bronchi or even cause pneumonia. Cervical lymphadenitis ranks along with otitis media as a common complication. The anterior cervical lymph glands are usually enlarged at least to some extent during the acute illness but subside to normal after the first week. However, acute suppurative lymphadenitis occurs occasionally and has to be treated early with local warm applications and large doses of antibiotics. If the process advances to the point of softening, incision and drainage must be carried out.

Streptococci may metastasize through the blood stream to distant parts of the body during the acute stage of scarlet fever, causing osteomyelitis, endocarditis, myocarditis, pericarditis, septicemia, tissue abscess formation, suppurative arthritis, or brain abscess. Carditis may also be toxic early in the disease, with cardiac weakness, dilatation, tachycardia, arrhythmia, and failure.

Acute rheumatic fever and acute hemorrhagic nephritis may develop during the second or third week after the onset of scarlet fever. The etiology of both diseases is not definitely established, but they are thought to be an allergic reaction to the streptococcus or its toxin. There is no need to discuss the care of either of these diseases, but one must be on the alert for them following scarlet fever. The incidence of these complications has dropped sharply in the last ten or fifteen years. It is the writer's opinion that the present incidence is not more than 2 or 3 per cent. Rheumatic fever is ushered in by lassitude, fever, and transient or migratory polyarthritides. In some

cases, arthritis is mild or absent, and an apical systolic murmur of mitral insufficiency is the first positive evidence of rheumatic fever. The sedimentation rate is markedly increased in both rheumatic fever and nephritis. Nephritis is attended by edema, hypertension, and malaise, together with albuminuria, red blood cells, and casts in the urine.

DIFFERENTIAL DIAGNOSIS

Mild cases of scarlet fever are often difficult to differentiate from rubella. The latter is the disease that most often raises the question of whether or not one is dealing with a mild scarlet fever. The rash of rubella may be very similar to that of mild scarlet fever, and the clinical symptoms are not unlike those of scarlatina. The white blood cell count and differential smear are of help in separating the two diseases, as rubella, which is a virus disease, is accompanied by leukopenia and lymphocytosis. A throat culture containing group A hemolytic streptococcus also establishes the diagnosis of scarlet fever. Erythema infectiosum and roseola must also be ruled out at times.

Scarlatiniform eruptions may occur from such drugs as salicylates, penicillin, atropine, antipyrine, and others. Some cases of urticaria and serum sickness may cause a rash similar to that of scarlet fever. Infectious mononucleosis, influenza, and typhoid fever are examples of diseases which occasionally manifest a scarlatiniform eruption. Of course, in all of these conditions, the typical findings in the throat and on the tongue are lacking as well as typical clinical manifestations.

A Dick test or Schultz-Charlton test is helpful in selected cases. Another test is the tourniquet test, in which a tourniquet is applied tightly around the arm above the elbow for two or three minutes. The presence of numerous petechiae below the constricted site is supposed to be characteristic of scarlet fever (Rumpel-Leede sign), but there is some question as to whether this is a reliable criterion of the disease.

Occasionally, a doubtful case is seen in which desquamation is later of help in establishing the diagnosis. If there is doubt about the diagnosis of scarlet fever, the disease should be tentatively diagnosed and proper isolation precautions and treatment maintained until the disease is proved not to be scarlet fever.

TREATMENT

Bed rest and penicillin are the two most important factors in treatment. All authorities agree that rest in bed is necessary at least until the

temperature has been normal for a week. It seems that this may be a little longer than necessary in a mild case, and, in such cases, a total period of bed rest of a week is probably enough followed by another week of reduced activity at home. In severe or complicated cases, there is no doubt that prolonged bed rest for several weeks may be needed. With the present well-justified trend toward shorter isolation periods, one must remember that the complications usually occur in the second or third week. It is our practice to examine every child with scarlet fever during the second or third week after onset, after he has been clinically well for approximately a week. Urinalysis is done at that time together with a complete physical examination as well as a hemoglobin, sedimentation rate, and complete blood count if indicated by the patient's physical examination and general condition.

Penicillin is the antibiotic of choice in scarlet fever, as the group A hemolytic streptococcus is almost always susceptible to it. As in other group A streptococcal infections, treatment should be continued for ten days. This can be done in one of several ways. Aqueous procaine penicillin may be given intramuscularly in a dosage of 600,000 units every other day for 3 or 4 injections. Oral penicillin, such as V-cillin K can be administered in a dosage of 125 to 250 mg, three times daily for ten days. A single dose of long-acting benzathine (Bicillin), 600,000 units, may be combined with an equal amount of procaine penicillin to give a high blood level for forty-eight hours followed by a lower sustained effect long enough to eliminate the streptococcus from the throat and tissues. The sulfonamides, erythromycin, tetracycline, or tetracycline V, Chloromycetin, Terramycin, or Aureomycin may be given in place of penicillin to patients suspected of being sensitive to penicillin. These agents must be continued for the same length of time as penicillin in appropriate dosage for age.

The treatment of the complications of scarlet fever need not be discussed here except to emphasize that prompt and adequate use of penicillin, other antibiotics, or sulfonamides has been an important factor in reducing the incidence of all complications, toxic as well as septic or bacterial. This is true even though antibiotics have no antitoxic properties. By their bactericidal or bacteriostatic action, they reduce the formation of toxins as well as bacterial growth and spread.

PREVENTION

Inasmuch as scarlet fever is potentially a serious disease, every reasonable attempt should be made to prevent its occurrence. For example,

when a case breaks out in a home, other members of the family should take prophylactic penicillin for five days in a dosage of 125 to 250 mg. of V-cillin or V-cillin K twice daily. Intramuscular long-acting Bicillin serves the same purpose in a dosage of 600,000 to 1,200,000 units, depending on age. Other antibiotics or sulfonamides may be given to individuals resistant or allergic to penicillin in a dosage not to exceed half of the therapeutic dose and divided in 2 daily doses for five days. Prophylaxis should be given even to exposed individuals who have had scarlet fever, as they are susceptible to all symptoms of streptococcal disease except the rash. Exposed school children among family contacts should be kept at home for a week out of contact with the patient and be examined by a physician before returning to school. Present recommendations allow parents to continue their normal activities and work, providing they are not food handlers or in close contact with children.

Children who have had casual contact with a case of scarlet fever, such as in school, should take prophylactic antibiotics as already outlined but need not be excluded from school. If a number of cases should break out in a school or school room, it might be necessary to close the school or the room for about two weeks as an added safeguard. This is seldom necessary, however, as most cases occur sporadically and not in massive epidemic form.

Proper isolation of the patient himself is essential. He should be in a room by himself during the infectious stage of the disease and be cared for by only one person, preferably the mother, who uses care not to spread the germs on her clothing or hands. This is best done by wearing a gown or apron when taking care of the child and washing the hands before leaving the room, both before and after removing the apron or gown. The physician has an obligation to the patient and to the community to continue treatment and isolation precautions until he can be sure that active infection has subsided. A minimum of one week isolation is presently recom-

mended by most authorities. This minimum isolation period often has to be doubled and sometimes tripled. Even in mild cases, a child should not return to school in less than two weeks after onset of the disease, chiefly for his own protection against possible complications.

Active immunization against scarlet fever has been carried out to a limited extent in the past but is no longer recommended. To do this, Dick scarlet fever toxin is given subcutaneously once a week for five weeks. Systemic reactions to this procedure are often severe, and the protection afforded is primarily against the rash and not the streptococcal infection, so that most authorities at present advise against its use.

PROGNOSIS

The mortality rate of scarlet fever has been falling steadily during the past twenty years with the use of sulfonamides, penicillin, and other antibiotics. Those who treated scarlet fever prior to that time can recall the frequent myringotomies, incisions of abscesses, and mastoidectomies, with more serious complications and death a too common final outcome. While scarlet fever in general is a milder disease now, it is possible that it would resume its more serious aspects if our present antibiotics were not available. Those who have had to depend on scarlet fever antitoxin and convalescent serum can recall the doubtful results obtained with such treatment. The present mortality rate is said to be 1 or 2 per cent but is probably even lower. When death occurs, it is usually in the younger child or infant who has not had the benefit of prompt treatment. Death is ordinarily the result of septic complications and occurs during the first week or ten days of illness.

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Treatment of Recurrent Convulsions in Children

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MANY CHILDREN with convulsive disorders can be treated successfully by present-day methods. Before 1900, the bromides were the only fairly effective drugs, and, in rare cases, traumatic epilepsy was helped by surgical treatment. At present, at least 15 drugs are known to be effective; several others are helpful at times; and new anticonvulsants are being found and studied each year.

Another useful form of treatment is the ketogenic or high-fat diet. This is effective in children but not in adults.

Thanks to the work of neurosurgeons and, particularly, to that of Dr. W. G. Penfield of the Montreal Neurological Institute, surgical treatment in carefully selected cases has become more and more effective. This is particularly true among adults but less so among young children.

USE OF ANTICONVULSANT DRUGS

In the use of anticonvulsant drugs, the following points must be kept in mind:

1. Treatment should be started as soon as the diagnosis has been established, and the drug that is most likely to be effective should be selected. For example, trimethadione (Tridione) is the drug of choice for petit mal seizures.

2. A small or moderate-sized dose of the drug should be given at first and increased until attacks are controlled or until signs of toxicity, such as rash or ataxia, appear.

3. If one drug does not control the attacks, one or more other drugs may be added. Again, the dose should be increased until control is gained or signs of toxicity appear.

4. Administration of anticonvulsant drugs should be continued after attacks have ceased for a minimum of two years and preferably three to five years. The dose may then be reduced gradually over a period of a year or more.

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If seizures recur, the dose must again be increased immediately.

5. As with the administration of all drugs, the patient must be observed frequently for signs of toxic effects, such as vomiting, rash, ataxia, and other less common signs. When drugs such as trimethadione (Tridione), paramethadione (Paradione), 5-ethyl-3-methyl-5-phenylhydantoin (Mesantoin), and phenacemide (Phenurone) are being given, the physician should be alert for blood dyscrasia as well as for rash.

Anticonvulsant drugs in common use are listed with the dosage in table 1.

Bromides were first used approximately one hundred years ago in the treatment of epilepsy. Although other drugs have been developed, bromides remain among the more effective anticonvulsants. They are usually prescribed as triple bromides.

Phenobarbital, introduced by Hauptmann in 1912, is an effective anticonvulsant of low toxicity. It is probably used today more commonly than any other anticonvulsant drug. A modification of this substance, mephobarbital (Mebaral) was introduced in 1932 and another barbiturate, metharbital (Gemonil), in 1950. Both are fairly effective anticonvulsants of relatively low toxicity.

Another group of drugs, the hydantoins, are useful. Diphenylhydantoin (Dilantin Sodium) was discovered in 1938 by Merritt and Putnam,¹ as a result of testing a large number of drugs for their effect in controlling electrically produced convulsions. This anticonvulsant has proved to be relatively effective, especially in controlling grand mal seizures, and it is almost as widely used as phenobarbital. However, it causes more side reactions. A similar hydantoin, 5-ethyl-3-methyl-5-phenylhydantoin (Mesantoin), is used in the same way as Dilantin, but it tends to cause more serious toxic reactions and must be used with caution and with the patient under close observation. More recently, another hydantoin, 3-ethyl-5-phenylhydantoin (Peganone), has been

TABLE 1
ANTICONVULSANT DRUGS

<i>Drug</i>	<i>Initial dose</i>		<i>Preferred in:</i>	<i>Toxic effects</i>
Bromides	0.3	gm.	Grand mal	Drowsiness, acneform eruptions
Barbiturates				
Phenobarbital	16	mg.	Grand mal	Drowsiness, irritability, rash
Mebaral	32	mg.	Grand mal	Drowsiness, irritability, rash
Gemonil	32	mg.	Grand mal	Drowsiness, irritability, rash
Hydantoins				
Dilantin	32	mg.	Grand mal; mixed grand and petit mal	Ataxia, diplopia, nystagmus, rash, nausea, vomiting, gingival hypertrophy
Mesantoin	50	mg.	Grand mal; mixed grand and petit mal	Drowsiness, rash, pancytopenia, agranulocytosis
Succinimides				
Milontin	0.5	gm.	Petit mal	Drowsiness, vertigo, hematuria, rash, ataxia
Celontin	0.5	gm.	Petit mal; mixed grand and petit mal	Drowsiness, vertigo, hematuria, rash, ataxia
Others				
Trimethadione (Tridione)	0.15	gm.	Petit mal; akinetic and myoclonic seizures	Photophobia, rash, agranulocytosis
Paradione	0.15	gm.	Petit mal; akinetic and myoclonic seizures	Photophobia, rash, agranulocytosis
Mysoline	0.125	gm.	Grand mal; focal motor seizures	Drowsiness, dizziness, ataxia, rash
Phenurone	0.5	gm.	Grand mal; psychomotor	Rash, hepatitis, pancytopenia, leukopenia, personality disturbance
Benzedrine	2.5	mg.	Petit mal	Irritability, restlessness, insomnia
Dexedrine	2.5	mg.	Petit mal	Irritability, restlessness, insomnia
Diamox	0.125	gm.	Petit mal	Rash, bone marrow injury
Meprobamate	0.1	gm.	Petit mal	Drowsiness, aggravation of grand mal seizures

placed on the market. It is proving helpful in various types of convulsive disorders in children, but it has not been in use long enough to be certain of its permanent value.

Trimethadione (Tridione) and paramethadione (Paradione), discovered in 1945 and 1949, have been of great value in treating patients with petit mal seizures as well as those with akinetic and myoclonic attacks. Both drugs occasionally cause serious skin or other toxic reactions and must be used cautiously. They also may predispose patients toward major seizures, but they can be used in combination with the barbiturates.

In 1951, Zimmerman² reported the use of phen-suximide (Milontin) to control petit mal attacks. This has not proved as effective as was hoped, but a similar substance, methsuximide (Celontin), has been used recently with more

satisfactory results. Side effects have been noted with both drugs: namely, dizziness, rash, drowsiness, ataxia, and other more minor symptoms. In a few cases, toxic effects necessitated withdrawal of the drug.

Phenacemide (Phenurone) has been reported to have completely controlled convulsive attacks in 23 per cent of a small group of children.³ Livingston and Kajdi⁴ reported on a group of 104 patients treated with this drug and found that it was effective only in psychomotor epilepsy. It tends to cause unfavorable side effects, such as rash, personality disturbances, and, occasionally, disturbances of liver function. It must be used with caution, but children seem to tolerate it better than adults.

Primidone, 5-phenyl-5-ethylhexahydropyrimidine-4,6-dione (Mysoline), has been shown to control both generalized convulsions and auto-

matisms. In one series of cases, it controlled the attacks in 57 per cent of patients who had not been previously treated. In the beginning, children are given small doses, which are rapidly increased to tolerance or the desirable therapeutic effect.

Amphetamine sulfate (Benzedrine) and dextro-amphetamine sulfate (Dexedrine) were recommended by Livingston⁵ for petit mal, but they have not been as satisfactory as the diones.

Acetazolamide (Diamox), a derivative of the sulfonamide drugs, acts as an inhibitor of carbonic anhydrase. It has been found to reduce the frequency of seizures, mainly the petit mal attacks but also, in some cases, the major convulsions and the attacks in those patients with spike and wave discharges appearing in their electroencephalograms. Its beneficial effect seems to last only a few weeks in many cases, that is, a tolerance develops which prevents its anti-convulsant action. Minor side reactions occur but major toxic effects do not.

Meprobamate is a relatively new anticonvulsant drug, and patients with petit mal have been reported as benefited by its use. Its action appears to be slower and less certain than that of Tridione. No definite toxic effects have been observed, but it has been reported that it aggravates grand mal attacks.

KETOGENIC DIET

This diet is of considerable value in treating children. It is thought difficult to administer, but my colleagues and I have found that children take the meals well and that the diet can be readily worked out with the help of a dietitian, so that mothers can quickly learn how to prepare the food.

To be effective, a ketogenic diet must be rigidly controlled and should be weighed. It is necessary that the ratio of the ketogenic material to the antiketogenic material be at least 3:1. This ratio is calculated according to Wood-yatt's formula in the following manner:

- Ketogenic material — 90 per cent of fat
46 per cent of protein
- Antiketogenic material — All of carbohydrate
58 per cent of protein
10 per cent of fat

Therefore:

Ketogenic (or fatty acid)

Antiketogenic (glucose)

0.90F + 0.46P

C + 0.10F + 0.58P

=

The diet is calculated for the individual patient as follows: The number of calories allowed is 55 per kilogram or 25 per pound of body weight. The amount of protein is set at 1 gm.

TABLE 2
PLAN FOR BEGINNING USE OF KETOGENIC DIET
BY 8-YEAR-OLD BOY

Weight: 55 lb. (25 kg.)
Calories: 1,375
25 calories per lb. (55 cal. per kg.) of body weight

Day of diet	Carbohydrate, gm.	Protein, gm.	Fat, gm.	Calories	Ratio: K/AK°
1st	50	25	119	1,371	1.5
2nd	35	25	126	1,374	2
3rd	20	25	133	1,377	2.7
4th	15	25	135	1,375	3.1

°Ratio of ketogenic to antiketogenic material.

per kilogram of body weight, which has been found to be satisfactory. The carbohydrate and the fat are then adjusted so that the ratio is as indicated, and the calories are satisfactory for nutrition and growth. The caloric requirement is based on the estimated weight for height, as given in standard tables.

When the diet is begun, the amount of carbohydrate taken is decreased, and the amount of fat is increased over a period of four days (table 2). This gradual change is advisable because most children who are immediately given the full diet become nauseated and sometimes vomit severely. However, this very seldom occurs with the indicated plan.

In order to make certain that the patient is in a state of ketosis, a test for diacetic acid is made on the first specimen of urine passed each morning. The patient's mother can be taught to do this readily. Patients must be kept on this diet and in ketosis for six to twelve months. The carbohydrate in the diet is then gradually increased, and the amount of fat is reduced until the diet is essentially normal again, which usually takes three to twelve months.

SURGICAL MEASURES

Surgical treatment has been shown to be effective in certain well-chosen cases. In the extensive work done by Penfield and Jasper,⁶ patients were reported in 3 groups: (1) those who underwent operations from 1929 to 1939; (2) those who were treated surgically from 1939 to 1944, inclusive; and (3) those operated on for seizures caused by lesions of the temporal lobe from 1939 to 1949, inclusive. Patients of the first group were traced for one to eleven years, and, in 43 per cent, treatment was successful. That is, they had had no seizures after operation, or they had had 1 or 2 attacks and then cessation of seizures after operation. Patients of the second group were traced for one to seven years,

and, in 56 per cent, treatment was successful. Patients of the third group were traced for one to eleven years, and, in 53 per cent, surgical treatment was considered successful.

RESULTS OF TREATMENT

The patient with recurring convulsions is interested in complete and permanent control of his attacks, and there are few reports of this having been accomplished over long periods of time. In a study of the use of bromides, Turner⁷ stated that attacks of 23.5 per cent of 366 patients were arrested for two and one-half to twenty-two years. Aricff,⁸ in 1951, reported observations in the treatment of 543 patients, indicating that in 61 per cent of his cases remissions of six months to ten years were produced by the use of triple bromides, phenobarbital, or the two drugs combined.

Yahr and associates⁹ reported studies on 319 patients. With the use of Dilantin and phenobarbital, the attacks of 79 per cent were controlled or decreased. The patients whose attacks were considered controlled were those who were free of seizures for less than six months up to five and one-half years. The improved patients were those whose seizures were reduced at least 50 per cent.

Of 190 patients treated by the ketogenic diet whose cases I have studied, 35.3 per cent remained entirely free of attacks for four to twenty-two years, although treatment actually lasted

only one to three years, and another 8.4 per cent improved. The 190 patients had grand mal, petit mal, or both types of seizures.

From these published results, it seems encouraging that complete control of convulsive attacks can be obtained in 23.5 to 35.3 per cent of cases for as long as twenty-two years, and, of course, the seizures of many more patients are completely controlled for shorter periods. Surgical treatment may control episodes in as many as 56 per cent of specially selected cases. In addition, many patients are greatly helped by these forms of treatment, although their convulsive attacks may not be entirely eliminated.

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LOW CEREBROSPINAL FLUID PRESSURE is a sign of clinical significance in several syndromes associated with cerebral hypotension. The normal range of spinal fluid pressure in the lateral recumbent position is 70 to 180 mm. of water.

Cerebral hypotension after cranial trauma is probably caused by diminished production of cerebrospinal fluid by the choroid plexus. The underlying cause is a general decrease in cerebral circulation shown as disturbed consciousness. Of 32 cases of cerebral hypotension, 14 followed trauma. The most prominent symptom was headache, aggravated by the upright position. Symptoms were frequently relieved by carbon dioxide inhalation.

A spontaneous variety of cerebral hypotension was seen in 3 patients. Although carbon dioxide inhalation was temporarily helpful, headaches persisted for several weeks, particularly when patients were in the upright position. Vertigo was the chief symptom in 4 elderly patients, 2 with hypertension, in whom reduced cerebrospinal fluid production was probably of reflex or direct vasospastic origin. Decreased fluid pressure was apparently related to diminished cerebral circulation in 11 hypertensive or arteriosclerotic patients. Carbon dioxide inhalations were usually of great benefit.

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Congenital Atresia of the Duodenum

Twenty-One-Year Interval Report

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THIS CASE was previously reported in March 1942,¹ when the patient was 5 years old. This article will cover the events in the next sixteen years of this boy's life.

Briefly summarizing the 1942 article, a gastrojejunostomy (figure 1) was done by G. I. W. C. on a newborn, 5-lb., 11-oz. baby for an atresia of the duodenum above the ampulla of Vater. In addition, the infant was found to have a band obstruction of the sigmoid which was clipped a week later. He also had a spina bifida occulta with short tendo achillis, a functional systolic murmur at the apex of the heart, and an orthostatic albuminuria. In the first eleven years of his life after the surgery, his course was without incident, and his development was normal for a boy of his age. However, on and since December 28, 1948, he began to have periods of upper gastrointestinal distress with accompanying anemia, fainting spells, and occult blood in the stools. This first hemorrhage followed a blow in the epigastrium while scuffling with an older boy. The hemoglobin fell to 56 per cent or 8.65 gm. and the red blood count to 3,000,000. He recovered completely on hematinics and medical management.

A year later, on January 11, 1949, he had a similar episode of moderate upper gastrointestinal bleeding which responded to blood tonics, diet, and Pro-Banthine. He had no more gastrointestinal trouble for the next four years. Then on October 26, 1953, and on January 3, 1954, he bled quite severely and the hemoglobin fell to 40 per cent or 5.75 gm. and the red blood count to 3,060,000.

Surgical exploration was decided upon, and on January 14, 1954, we carried out this procedure. We found that the bleeding was coming from the stoma and an ectopic piece of pancreas in the anterior gastric wall. We also discovered that the atresia was caused by annular pancreatic tissue and scar (figure 2). The following surgical

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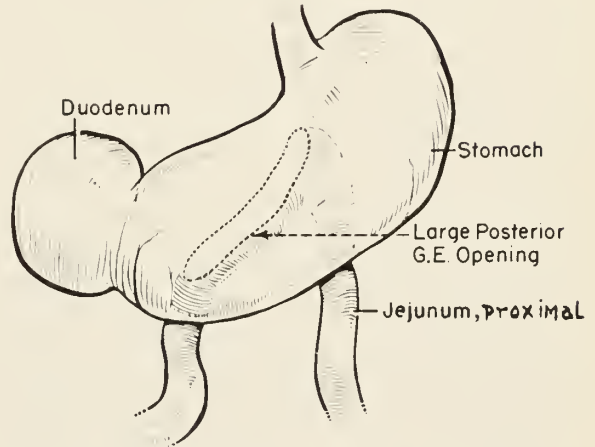


Fig. 1. First operation at birth showing large posterior gastroenterostomy opening for adult life and obstructed duodenum.

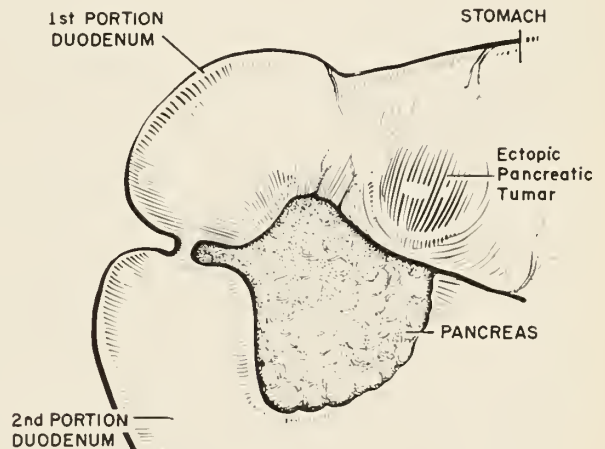


Fig. 2. Third operation, which was exploratory, disclosed the 2 blind ends of duodenum connected by a solid cord covered by pancreatic and fibrous tissue. Ectopic pancreatic tumor in anterior stomach wall is also shown.

corrective measures were used: (1) disconnection of the old gastrojejunostomy, (2) duodeno-duodenostomy, (3) excision of the ectopic pancreatic tumor, and (4) incidental appendectomy (figure 3).

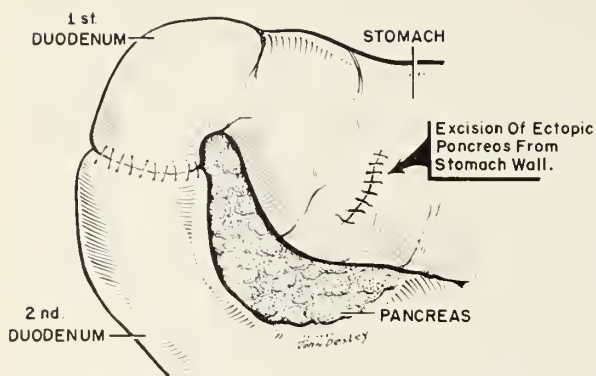


Fig. 3. Third operation showing excision of ectopic pancreas from stomach wall and duodenal anastomosis after old gastrojejunostomy was disconnected.

It has been over four and one-half years since the above surgical procedures were done, and the patient has been well ever since. We believe that he will have no more trouble.

In retrospect, we admit that some other type of short-circuit operation² might have produced better results than the gastrojejunostomy. Many surgeons prefer jejunoduodenostomy or duodenoduodenostomy. In this case, with the baby in poor condition, we selected the quickest and easiest method, and it is fortunate that we did, because, sooner or later, re-operation for the

ectopic pancreas would have become necessary. In the meantime, he has developed normally.

SUMMARY

We have presented an interval report on a twenty-one year follow-up of a patient with 7 congenital anomalies: (1) atresia of the duodenum, (2) annular pancreas, (3) ectopic pancreas, (4) spina bifida occulta, (5) short tendo-achillis, (6) functional heart murmur, and (7) orthostatic albuminuria. The anomalies of the gastrointestinal tract necessitated 3 separate surgical procedures. The other anomalies responded to medical and expectant treatment.

The final result is a normal, healthy 21-year-old young man who has just completed his pre-medical years with an average of A-. This fall, he will begin his first year of medicine. Except for his gastrointestinal tract, none of the anomalies has caused him any physical disability. As a youngster, the short tendo achillis caused him to walk on his toes for two years. Now he walks normally and runs the hundred-yard dash in eleven seconds. He actively competes in all forms of athletics.

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IN PATIENTS WITH CONGENITAL MALFORMATIONS of the heart who survive intrapericardial operations, a syndrome identical to the postcommissurotomy syndrome may be seen.

The syndrome occurs after transventricular and transarterial valvuloplasty for pulmonary stenosis, closure of septal defects, and exploration of the pericardium for inoperable congenital cardiac lesions. Although other factors may be important pathogenetically, the feature common to these operations in the nonrheumatic as well as the rheumatic patient is wide incision of the pericardium, with or without cardiectomy or valvotomy. The complication is not noted after operations wherein the pericardium is not disturbed or a small segment of pericardium is clamped to remove a cyst.

The term postpericardiectomy syndrome is suggested as being more applicable than postcommissurotomy syndrome. The syndrome is interpreted as traumatic pericarditis and may be a reaction to blood in the pericardial sac. This postoperative manifestation in nonrheumatic patients is a compelling argument against the theory that the syndrome in patients who have had mitral valvotomy usually represents reactivation of rheumatic fever.

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Injuries of the Urinary Tract

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THE ALARMING AND MOUNTING accident rate associated with increasing high speed transportation, vast industrialization, and increased participation in strenuous sports makes trauma a subject of ever increasing importance to the civilian practitioner of medicine.

KIDNEY INJURIES

Kidney injuries account for about one-fourth of one per cent of all hospital surgical admissions. Since the kidneys are soft, pulp-like organs always distended with blood and easily torn, they would be injured very often except for their protected location. The rigid spine, the lumbar muscles, the lower ribs, the cushion of perirenal fat, and the mobile attachments of the kidneys greatly reduce the incidence of trauma. The right kidney is injured more often than the left, probably because its intimate contact with the under surface of the liver reduces its mobility. Kidney injuries are slightly more common in children.

Wounds of the kidney are of 2 types. Penetrating wounds common in war are seen occasionally in civilian practice. They are the result of bullet wounds or other piercing objects brought into violent contact with the body. Much more common are the injuries resulting from direct force applied to the upper abdomen, loin, or costovertebral angle or by falls terminating in a severe blow to the kidney area. Falls on the buttocks, feet, or head may tear the kidney from its vascular pedicle. A rare type of kidney injury, of which the author has seen 1 case, resulted from sudden, violent twisting of the lumbar spine while lifting a heavy object.

Davis has shown that the soft, blood-distended kidney responds to a blow like a paper sack

filled with water. Since the force is transmitted in all directions, the kidney may be fragmented by many fractures. Severe crushing injuries may result in kidney damage, though the kidney injury may be of minor importance compared to trauma to the abdominal viscera. Diseased kidneys, especially those with a hydronephrotic sac or large polycystic kidneys, are more susceptible to injury.

The degree of injury ranges from a slight tear of the capsule with superficial fissuring of the parenchyma to complete fragmentation and destruction of the kidney's internal architecture. Also, the vascular pedicle may be involved with subsequent infarction of much of the kidney.

Shock of varying degree occurs in all cases of severe injury, although it may be delayed a few hours, particularly in children.

Pain in the hypochondrium, loin, or costovertebral angle is a constant symptom. Tenderness over the kidney in the back, as demonstrated by gentle fist percussion, is almost pathognomonic for lesions in or around the kidney. Tenderness in the upper abdomen and loin is pronounced. Associated muscle spasm may prevent deep palpation of the kidney region. Later, when rigidity is less marked, a large mass composed of blood and blood clots confined within Gerota's capsule may be palpated. Reflex peritoneal irritation and abdominal distention with or without nausea and vomiting are delayed symptoms. Symptoms of generalized peritonitis occur with hemorrhage into the free peritoneal cavity.

Blood occurs in the urine in 90 per cent of kidney injuries. It varies from a few red cells to a profuse, gross hematuria of sufficient degree to exsanguinate the patient. It may be absent occasionally if the ureter has been completely divided or is completely closed with blood clots.

Chills and fever denote the onset of infection secondary to urinary extravasation into the perirenal tissues or to spontaneous infection of large masses of extravasated blood.

The history is of value in evaluating the type of injury. With the exception of patients suffering from severe shock, most patients with kidney trauma are in sufficiently good condition to permit physical examination.

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External abrasions, contusions, or puncture wounds in the kidney region suggest kidney injury, but, in many cases, they are absent. The general picture of shock is easy to recognize, and the pulse rate, blood pressure, and blood count indicate its degree. Immediate urinalysis of either a voided or catheterized specimen is indicated. Physical examination gives a rough idea of the extent and direction of the renal hemorrhage.

The type and extent of the kidney injury is next determined by secretory urography, which produces satisfactory results in about 40 per cent of cases. If shock or severe kidney damage interferes with visualization by intravenous methods, cystoscopy and retrograde pyelography should be done at once. These procedures will denote any disturbance in the internal architecture of the kidney or extravasation into the perirenal tissues. Treatment is predicated on the basis of an accurate knowledge of the type and extent of the injury. This knowledge can be obtained only by these methods. They likewise establish the presence and condition of the uninjured kidney. This is, of course, of paramount importance when removal of the injured kidney is contemplated. Finally, roentgen studies of the kidney, ureter, and bladder tract reveal the kidney outlines, the psoas shadows, and the bony structures of the spine and pelvis.

TREATMENT OF KIDNEY INJURIES

The treatment of kidney injuries is either conservative or surgical, depending on the degree of injury and the associated hemorrhage. The indications for surgical intervention are controversial; surgeons of fairly equally large experience hold divergent views. The advocates of surgery, in most cases, point to the late effects of renal trauma, such as hydronephrosis, calculus, calcified cysts, and compression atrophy causing the Goldblatt type of hypertension. They infer that early surgical intervention would have prevented many of these sequelae.

The advocates of conservative treatment cite excellent results with equally large series of cases in which only 10 to 15 per cent of the patients were subjected to surgical treatment. Since the type of injury varies from a slight laceration of the parenchyma to complete fragmentation of the entire organ, the treatment varies with the degree of injury and the extent of the associated hemorrhage.

Minor injuries associated with slight or transient hematuria, slight pain in the kidney region, minimal physical findings, and fairly normal secretory or retrograde pyelograms may be treated

by hospitalization, absolute rest in bed, ice bags applied to the kidney region or external heat to the body, if indicated, and drugs to relieve pain or restlessness. Chemotherapy should be started at once in all cases. Periodic physical examinations, blood pressure, pulse rate, blood count, and urinalysis aid in following the progress of the case. Absolute rest in bed for two to three weeks is indicated. Hematuria should be absent for at least a week before the patient is allowed out of bed. Too early resumption of activity may precipitate a secondary hemorrhage. Pyelograms should be made in three to six months after discharge and compared with the originals.

The more severe injuries associated with shock, continued severe or recurrent bleeding, urinary suppression, or the symptoms of sepsis require surgical intervention. The surgical measures consist of control of the bleeding, removal of blood clots, suture of the injured kidney, if feasible, and provision for drainage. Rapid nephrectomy may be required if the bleeding cannot be controlled by suture or pack or if the kidney's blood supply has been severely damaged. The usual measures for recognizing and treating surgical shock either before, during, or after surgery are indicated, and surgical judgment is of paramount importance in treating these critical cases.

The prognosis in minor injuries is excellent. The mortality in severe renal injuries is about 30 per cent, although this figure can be greatly reduced when adequate facilities for prompt, accurate diagnosis and treatment are available.

Wounds to the ureter are rare except those occurring during various surgical procedures. While this is an important subject, time does not permit a discussion of it here.

Traumatic injuries to the urethra and bladder are of great surgical importance, because the life or future comfort of the patient often hinges upon the accurate diagnosis and prompt surgical treatment of these lesions. While comparatively infrequent due to the installation of safety devices by railroads and manufacturers, they are not uncommon results of automobile accidents, so-called straddle injuries in which the urethra is crushed against the pelvic bones, kicks or blows on the perineum, and numerous mishaps of the alcoholic who manages to fall upon a distended bladder. They are often associated with pelvic fractures and disruption of the pelvic ring.

A relatively small percentage of the total number of these injuries are encountered by the urologic surgeon. Most of them are surgical emergencies which are seen and treated by the general practitioner or which are referred by him to the general surgeon.

URETHRAL INJURIES

Urethral injuries are classified according to the degree of tearing as: (1) interstitial, in which the mucosa is intact, (2) partial rupture, in which the wound is a rent involving all layers of the urethra, and (3) complete rupture, in which the urethra is completely divided, probably with pronounced retraction of the torn ends.

These grades of injury cannot always be definitely established clinically. However, whenever the history of an injury commonly producing urethral trauma is associated with urinary retention, urethral bleeding, pain, and perineal hematoma, prompt surgical intervention is always indicated.

Ruptures of the pendulous urethra are rare and generally occur as a complication of a so-called fracture of the erect penis. Hemorrhage at the meatus, which may be profuse, does not necessarily indicate the extent of the injury. Marked tumefaction of the periurethral tissues caused by hemorrhage produces intense pain and rapidly increasing urinary difficulty. Diversion of the urinary stream by perineal urethrotomy or suprapubic cystostomy is the operation of choice. Many of these cases have been successfully treated immediately by retention catheter, as advocated by Haines, but the use of the catheter predisposes to infection, fistula formation, and urethral stricture.

In recognizing and treating injuries of the urethra proximal to the pendulous portion, a few fundamental points concerning the anatomy of the perirenal fasciae and urethra are essential.

Unless these fascial layers are ruptured at the time of the injury, they so completely limit the extent of blood and urinary extravasation that the exact location and degree of injury can be determined at the first examination.

Urine or blood entering the perineal tissues distal to the intact triangular ligament is confined superficially by Colles' fascia and prevented from extending backward by the inferior layer of the triangular ligament. Being limited laterally by the attachment of Colles' fascia to the ischio-pubic rami, it first distends the loose tissues of the scrotum and perineum and then extends up along the spermatic cord to the lower abdomen. The close attachment of Colles' fascia to Buck's fascia, which encloses the erectile bodies and the urethra, prevents early tumefaction of the penis, but, once the extravasation has reached the superficial abdominal layers, it may then extend down over the pubes to the superficial layers of the penis. The close attachment of Scarpa's fascia to Poupart's ligaments prevents descent to the thighs.

Injuries of the urethra at the triangular ligament or at the apex of the prostate, in which the inferior layer of the ligament remains intact, lead to tumefaction in the tissues around the prostate often with upward displacement of this structure, to boggy swellings in the ischiorectal fossa, and to distention of the space of Retzius with blood and urine.

In severe crushing injuries associated with pelvic fracture, the fascial layers may be injured so that both types of extravasation occur. In such cases, the bladder as well as the urethra may be torn or lacerated.

Ruptures of the bulbous urethra are commonly the result of straddle injuries or a kick or blow in the perineum, which crushes the urethra between the injuring body and the pubic arch. The extent and location of the injury are determined by the direction as well as the degree of the injuring force.

The symptoms and findings are severe pain, urinary frequency, or strangury with the passage of very blood-tinged urine or pure blood together with rapidly ensuing acute retention. Bleeding at the meatus is generally present, although, in severe injuries, it may be slight. Extensive tumefaction of the perineal tissues always indicates severe injury. When urinary extravasation occurs, it is limited by Colles' fascia. Diagnostic instruments usually find an impassable obstruction in the bulb if the rupture is complete. The strictest aseptic precautions should be observed in all diagnostic instrumentation, and a soft rubber catheter is less dangerous than a rigid instrument. Incomplete rupture is generally patulous to the catheter; complete rupture seldom is.

TREATMENT OF URETHRAL INJURIES

The treatment of all ruptures of the urethra involves a consideration of 3 points: (1) diversion of the urinary stream away from the injured urethra, (2) anatomic reconstruction of the injured urethra, and (3) treatment of stricture which generally follows all severe urethral injuries.

Diversion of the urinary stream away from the injured urethra. The merits of the individual case determine whether this is best done by retention catheter, perineal urethrotomy, or suprapubic cystostomy. A retention catheter increases the possibility of infection, fistula, and stricture, but many ruptures of the pendulous urethra can be successfully treated by this simple method. Perineal urethrotomy is probably the operation of choice in partial ruptures of the deep urethra when the urethra is patent to instruments, because perineal section not only affords dependent

drainage but permits suture of the urethral defect as well. Drainage by suprapubic cystostomy and retrograde instrumentation is the operation of choice in most complete ruptures of the deep urethra. This should be combined with perineal section, evacuation of clots, and urethral repair if the perineal hematoma is large or if urinary extravasation has already begun. Retrograde instruments greatly facilitate the location of the proximal end of the urethra. The urethra can then be closed by intramural sutures of fine catgut over a catheter.

Anatomic reconstruction of the injured urethra. Upon this point, there is considerable divergence of opinion. It is often true that open operation reveals a more severe injury and greater retraction of the ruptured ends of the urethra than physical findings indicated. In such a case, one feels certain that open operation and suture of the urethra are imperative. But, it is likewise true that if a patent channel is maintained between the divided ends of the urethra, the mucous membrane has the intrinsic power of covering large defects in which no suture is attempted.

Many who favor the latter procedure can cite numerous severe urethral injuries that have been treated simply by cystostomy and retrograde instrumentation with no attempt at urethral repair by perineal section. Yet, one cannot escape the feeling that anatomic reconstruction by suture of the urethra is a better surgical principle.

Treatment of stricture which follows almost all severe urethral injuries. Instrumentation should be begun after about fourteen days and continued at regular intervals for at least a year. When the retention catheter is removed after ten to fourteen days, it should be replaced immediately by a filiform designed to screw to a follower. By serving as a guide, this permits easy dilatation with the minimum amount of trauma at the site of the injury. The filiform is worn constantly for the next two or three weeks, after which the urethra may be safely instrumented with sounds. Regular dilatations for a period of many months are necessary, because the urethra must be kept at normal caliber at the site of the injury. The trauma of the urinary stream impinging against a narrow place is sufficient in itself to cause progressive contraction of the stricture area.

Rupture of the membranous urethra is most often associated with fractures of the pelvic bones and is always a most serious and not infrequently fatal injury. Disruption of the pelvic ring not only tears the urethra and both layers of the triangular ligament but often causes lac-

eration or rupture of the bladder and injury to other viscera.

Such cases tax the judgment of the surgeon. Blood transfusion and other supportive methods are often required before any surgery can be considered; yet, to wait many hours greatly increases the mortality.

Diversion of the urinary stream by suprapubic cystostomy protects the crushed urethral and perineal tissues from the dangers of urinary extravasation and also enables one to inspect the interior of the bladder for laceration or rupture. Retrograde instrumentation by paired sounds is a great aid in passing a retention catheter through the ruptured urethra. The catheter splints the urethra and tends to correct any deformity from possible rupture or laceration of the puboprostatic ligaments in addition to maintaining continuity and assisting in drainage. Perineal section and evacuation of blood clots are not imperative procedures but should be done if fractures do not make the lithotomy position dangerous or impossible. Occasionally, secondary repair of the urethra with closure of urinary fistula may be required.

Uncomplicated rupture of the posterior urethra is quite rare and generally results from instrumental trauma. Drainage by retention catheter is the treatment of choice, and, if the catheter is placed before urinary extravasation or infection develops, these injuries are usually not very serious. The posterior urethra, especially the prostatic portion, shows little tendency to subsequent stricture formation.

BLADDER INJURIES

Rupture of the bladder occurs about as often as rupture of other abdominal organs. It probably never occurs spontaneously in a normal bladder no matter how great the distention. With the exception of puncture wounds or tears, such as occur from bone fragments in pelvic fracture, gun shot wounds, or stab wounds, it is generally a rent in the bladder resulting from external violence applied over or near the distended organ. Even a slight fall has been known to rupture the greatly distended bladder, and the injury may not be suspected until peritonitis has developed.

Ruptures of the bladder may be either intraperitoneal or extraperitoneal, and ruptures into the peritoneal cavity are far more frequent as well as more serious. Ruptures generally involve the unsupported portions of the bladder wall near the vault and are usually simple transverse tears involving all layers of the bladder and its peritoneal covering.

If the rupture is extraperitoneal, the tissues are infiltrated with urine according to the location of the injury. If it occurs on the anterior wall, a prevesical tumefaction results. All extravasations rapidly fill the loose tissues around the bladder so that very soon both prevesical and retroperitoneal accumulations are seen. The triangular ligament prevents spread into the perineum, and rarely is there any spread to the ischio-rectal fossae.

The symptoms of bladder rupture are sometimes marked by shock, but pain is a constant feature. If the injury is intraperitoneal, the pain is peritoneal in origin and is often associated with distention, nausea, and vomiting. If extraperitoneal, the pain may be localized in the lower abdomen and may radiate to the perineum, penis, and thighs. Desire to void is constant, often amounting to strangury, and, unless the rent is very small, only small amounts of bloody urine can be passed. Fever occurs early and increases as sepsis develops.

Uncomplicated rupture of the bladder is generally diagnosed easily, but when associated with other injuries, particularly those of the urethra, the diagnosis can often be made only at operation.

Signs of severe bladder irritation and the failure to pass urine indicate catheterization, which should, of course, be done with aseptic precautions. If the urethra is patulous, urethral rupture is unlikely. If the rupture is large, a very small quantity of blood-stained urine is obtained. Or, in some instances, the catheter may pass through the rent into the abdominal cavity drawing off a large quantity of blood-stained urine from the peritoneal cavity. If the rupture is small, varying quantities of urine will be obtained, and the diagnosis is more difficult.

An ingenious test has been proposed by Vaughan and Rudnick. A measured quantity of air (about 400 cc., the capacity of the average bladder but less in young individuals) is introduced through a catheter. The bladder may be viewed during the injection through the fluoroscope, or a roentgenogram may be taken immediately after the injection is completed. If the bladder is intact, its outline is rounded and regular. If there is an extraperitoneal rupture, air is seen in the pelvic tissues or prevesical space. If the rupture is intraperitoneal, the air appears in the anterior part of the peritoneal cavity above the intestines, and the bladder is partially or entirely collapsed. This appears to be a reliable test, but, as in all other procedures that necessitate putting something into the bladder, it should be followed immediately by operation if rupture is demonstrated.

Often the diagnosis cannot be made with certainty until exploratory operation has been done.

TREATMENT OF BLADDER INJURIES

The treatment is operative in all cases, and the prognosis depends upon the promptness of operative interference. Unless operated upon, all intraperitoneal ruptures of the bladder are fatal in seven to fourteen days.

The bladder is exposed through a midline suprapubic incision. It is preferable to open the peritoneal cavity and carefully explore the peritoneal surface of the bladder before opening the bladder cavity; otherwise, small intraperitoneal injuries may be overlooked.

Extraperitoneal injuries are less serious but require prompt suprapubic cystostomy and free drainage of the space around the bladder. If the patient is operated upon early, the prognosis is excellent.

Curable Hypertension

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ALTHOUGH THE MEDICAL TREATMENT of hypertension is rather effective, it is fraught with many unpleasant and, at times, dangerous side reactions. It is expensive, time-consuming, and tedious; and it is only palliative. Cessation of treatment is followed promptly by resumption of hypertension in most cases.

For these reasons, the physician who undertakes the treatment of hypertensive patients should conduct a diligent search for the causes of hypertension that are potentially amenable to cure by appropriate surgical attack. These include coarctation of the aorta, tumors of the adrenal medulla (pheochromocytoma), tumors or hyperplasia of the adrenal cortex (Cushing's syndrome and primary aldosteronism), unilateral disease of the renal parenchyma (atrophic pyelonephritis, hydronephrosis, and renal tuberculosis), and occlusive disease of one or both renal arteries or their branches.

Imperative for the diagnosis of these conditions are clinical acumen, a high index of suspicion, a carefully elicited history, a carefully performed physical examination, and a certain compulsion about routinely subjecting hypertensive patients to special laboratory investigations, for some of these causes of secondary hypertension may be discovered more by chance than by sagacity.

Clues that hypertension may be secondary and not primary include: (1) recent or sudden onset of hypertension, especially if the family history is negative for hypertensive disease; (2) hypertension in persons less than 30 years of age and especially in children; (3) the appearance of hypertensive retinopathy of group 3 or 4 soon after the onset of hypertension; and (4) severe hypertensive retinopathy with minimal or no sclerosis of the retinal arterioles.

Having made these generalizations, I hasten to add that secondary hypertension can be mild and unaccompanied by severe grades of reti-

nopathy. It can occur in old as well as young patients, and long duration of hypertension does not rule out secondary hypertension, but it does lessen the chances that operation will effect permanent reduction in blood pressure.

Not pertinent to this discussion are those types of secondary hypertension which are not amenable to surgical treatment and potential cure. These conditions include bilateral renal disease, such as polycystic kidneys and acute and chronic nephritis.

COARCTATION OF THE AORTA

When hypertension is encountered in children or adolescents, coarctation of the aorta should be suspected. I do not mean to imply that coarctation of the aorta should not be considered in adult hypertensive patients, for some persons with this condition may survive into the fifth decade.

The history is of little value in making the diagnosis, since coarctation of the aorta is usually an asymptomatic condition. Because of associated murmurs in the cardiac region, the erroneous diagnosis of rheumatic fever is sometimes made. Thus, any hypertensive child or adolescent who has been told that he has a "rheumatic heart" may well prove to have coarctation of the aorta.

The diagnosis is usually made from findings at physical examination and is confirmed by roentgenograms of the thorax. Unfortunately, for us clinicians, the reverse order occasionally obtains. Typical findings on examination are hypertension in the upper extremities, usually of mild degree; impalpable pulses in the abdominal aorta and lower extremities; and thrills and bruits over the posterior aspect of the rib cage due to the enlarged and tortuous intercostal arteries which serve as collateral vessels in transporting blood around the coarcted region. A systolic murmur may be heard along the left sternal border and to the left of the spinal column in the interscapular region of the back. Palpation of the femoral pulses in the groin is the most important maneuver in the examination. Coarctation of the aorta is the only condition in a child or adolescent that causes absence of femoral

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pulses with little or no evidence of serious ischemia in the lower extremities. The presence of femoral pulses does not always rule out this anomaly, however, for if collateral circulation is abundant, there may be pulsatile flow in the lower extremities. In such cases, though, the pulses are usually diminished in amplitude, and the blood pressure is lower in the legs than in the arms.

When coarctation occurs proximal to or at the origin of the left subclavian artery, pulses may be absent or diminished in the left arm as well as in the legs. If anomalous origin of the right subclavian artery is distal to the coarctation, a similar situation may exist in the right arm. In rare but fascinating cases, in which there is a right-to-left shunt through a patent ductus arteriosus distal to coarctation of the aorta, cyanosis is confined to the lower half of the body.

Bicuspid aortic valve is associated with coarctation of the aorta in approximately a third of cases and may give rise to the murmur of aortic regurgitation.

Typical x-ray findings include absence or decreased prominence of the aortic knob and notching along the inferior margins of the ribs posteriorly due to erosion by the dilated and tortuous intercostal arteries. There may or may not be evidence of cardiac enlargement with prominence of the left ventricle.

Only rarely must one resort for diagnosis to simultaneous direct blood pressure and pulse wave contour studies from the radial and femoral arteries. Angiocardiography and thoracic aortography are sometimes helpful in determining the extent of the coarctation but are not necessary routinely. Surgical resection of the aorta is the only effective treatment. End-to-end anastomosis can usually be accomplished without interposition of a graft. Unless serious cardiac embarrassment occurs, most surgeons prefer to defer surgery in children until the patient is 8 to 12 years of age.

ADRENAL TUMORS OR HYPERPLASIA

Medullary tumors. Pheochromocytomas are chromaffin tissue tumors which usually occur in the adrenal medulla. These tumors secrete excessive amounts of epinephrine and norepinephrine, thereby causing paroxysmal or sustained hypertension. In the past thirteen years at the Mayo Clinic, the diagnosis of pheochromocytoma has been made preoperatively in more than 60 patients, all of whom had their tumors surgically removed without operative mortality. The tumors may be multiple and occur in chromaffin tissue other than the adrenal medulla. In our

experience, they have been found along the aorta, at the bifurcation of the aorta, and behind the right lobe of the liver.

Approximately 50 per cent of the tumors seem to secrete their pressor substances more or less continuously, producing sustained hypertension that may be easily confused with ordinary essential hypertension.¹

Pheochromocytoma may occur at any age. The history is often helpful in alerting the physician to the possibility of such tumors. Severe and frequently paroxysmal headaches, excessive sweating, tremors, palpitations, increasing nervousness, and loss of weight are valuable clues to this diagnosis.

Even in patients with sustained or persistent hypertension caused by pheochromocytoma, the blood pressure tends to fluctuate widely, and paroxysmal attacks of headache, sweating, and tremulousness accompanied by pallor and excessive hypertension (at times to more than 300 mm. of mercury systolic and 150 mm. diastolic) may occur. Patients whose hypertension has responded paradoxically to medical treatment, especially to ganglion-blocking agents, should be suspected of having pheochromocytoma. This is also true of patients whose blood pressure rises sharply during induction of anesthesia.

Patients with sustained hypertension caused by pheochromocytoma are almost always thin. Tachycardia is common. The tumor is rarely palpable. Most of these patients have elevated basal metabolic rates, some markedly so. In fact, the highest basal metabolic rates ever recorded at the Mayo Clinic have been in patients with such tumors. This hypermetabolism in addition to the symptoms and physical findings often leads to mistaken diagnoses of hyperthyroidism. Fortunately, the protein-bound iodine and radioiodine tracer studies yield normal findings when hypermetabolism is caused by pheochromocytoma. About 50 per cent of patients with hypertension secondary to pheochromocytoma have elevated levels of fasting blood sugar. The triad of H's, therefore, has come to be helpful diagnostically: (1) hypertension, (2) hypermetabolism without hyperthyroidism, and (3) hyperglycemia.

Definite tests for pheochromocytoma are of two types: pharmacologic and chemical. Phentolamine (Regitine) is used most widely in the pharmacologic test when hypertension is persistent.² After the patient has been at rest and the basal blood pressure has been determined, 5 mg. of this drug is given intravenously. A drop, usually within five minutes, of more than 40 mm. of mercury systolic and 25 mm. diastolic from

the basal levels is considered positive evidence of a pheochromocytoma. Falsely positive results occur with disappointing frequency, especially if adequate basal levels of blood pressure have not been obtained or if the patient has received sedation or is under the influence of antihypertensive medication at the time the test is done.

More and more diagnostic reliance is being placed on chemical determinations of plasma pressor amines^{1,3} or urinary catecholamines⁴ or both. Such tests, if done properly, are accurate but unfortunately are so complicated that they are not at present widely available, whereas the Regitine test can be carried out in the physician's office.

We feel that pharmacologic or chemical tests for pheochromocytoma should be performed more or less routinely for all hypertensive patients, since, in a few, the history and laboratory findings fail to reveal whether a tumor is present.

Pharmacologic and chemical tests are not always conclusive, and, at times, surgical exploration may be indicated as a diagnostic as well as therapeutic procedure. Unfortunately, excretory urography more often than not fails to localize the tumor, and retroperitoneal insufflation of air is potentially hazardous. For these reasons and because the tumors are sometimes multiple and can occur in extra-adrenal sites, exploration of the abdomen through a transverse upper abdominal incision is the procedure of choice.¹ Expert control of blood pressure during and after the surgical procedure is mandatory. Regitine is given to control the paroxysms of excessive hypertension that characteristically occur during induction of anesthesia and operative manipulation of the tumor. Levarterenol (Levophed) or metaraminol (Aramine) is needed to combat hypotension during the first hours after the tumor has been removed.

Surgical exploration is indicated not only in an effort to alleviate the hypertension but also because 10 per cent of pheochromocytomas are malignant. Hypertension is regularly ameliorated by removal of the tumors, although not all patients become normotensive.

Hyperplasia or tumors of the adrenal cortex can produce two conditions to which hypertension may be secondary or associated.

1. *Cushing's syndrome.*⁵ Ninety per cent of patients with Cushing's syndrome have hypertension. Although usually mild, it may be severe and constitute the chief complaint. Eighty per cent of patients with Cushing's syndrome are women, usually less than 50 years of age. It rarely occurs in children.

The characteristic appearance of the patient

is the most important clue to diagnosis. Typical is the round or moon facies with truncal obesity, cervicodorsal hump, plethora, acne, hirsutism, and purplish striae.

The history is helpful only in so far as it confirms a change in facies and body habitus; previous photographs of the patient are valuable in this regard. The history may reveal such non-specific complaints as weakness, amenorrhea, loss of libido, and psychic changes. A history of diabetes in addition to other findings is suggestive, since 80 per cent of the patients with Cushing's syndrome have hyperglycemia. Patients in whom this syndrome has led to severe osteoporosis and spontaneous fractures or vertebral collapse may reveal a history of bone pain.

Helpful laboratory data include lymphopenia, hyperglycemia, alkaline urine, hypokalemia, alkalosis, polycythemia, and osteoporosis. The most conclusive diagnostic test is the finding of elevated levels of corticosteroids in the urine and in the blood. The levels of 17-ketosteroids in urine may be normal.

Cushing's syndrome results from hyperfunctioning of the adrenal cortex, which usually is due to hyperplasia but sometimes to tumors. The treatment is surgical and consists of removing the adrenal cortical adenoma or carcinoma, if present, or total or subtotal adrenalectomy if hyperplasia is responsible. In most cases, the clinical features and hypertension regress after appropriate surgery.

2. *Primary aldosteronism.* Certain tumors of the adrenal cortex produce hypertension by secreting excessive amounts of aldosterone, an adrenal cortical steroid with a potent effect on sodium and potassium metabolism.⁶ In addition to hypertension, patients with primary aldosteronism may have muscular weakness and periodic attacks of actual paralysis associated with low levels of serum potassium. Polydipsia and polyuria may accompany this syndrome because of the kidney's inability to excrete concentrated urine. Edema is rare in spite of sodium retention caused by aldosterone.

The physical examination is not helpful, for the tumors are too small to be palpated.

The characteristic laboratory finding that should direct the clinician's attention to the possibility of primary aldosteronism is a low concentration of potassium in the serum, usually less than 3 mEq. per liter. The typical history of muscular weakness and periodic paralysis should be the clue for the physician to order a test of the serum for potassium. Unfortunately, some patients with primary aldosteronism have hypertension without unusual symptoms to alert

the physician. The expert electrocardiographer may see changes in the electrocardiogram which suggest hypokalemia. These include depression of the S-T segment, reduction of amplitude or even inversion of the T wave, and increase in the amplitude of the U wave. Prolongation of the Q-T interval as an indication of hypopotassemia has been disputed.⁷

A persistently dilute and alkaline urine is also a warning signal. However, in spite of all these helpful clues, the limitations of our present knowledge of this unusual condition are such that cases of primary aldosteronism may be overlooked unless tests for serum potassium are routinely obtained for hypertensive patients.

Two pitfalls should be avoided in interpreting serum potassium levels:

1. The low concentration of serum potassium so characteristic of primary aldosteronism may revert toward normal if the patient is on a diet restricted in sodium, thus depriving the physician of his most valuable diagnostic aid. Contrariwise, diets high in sodium tend to accentuate the hypokalemia.

2. Chlorothiazide (Diuril), which is now being used so widely as an antihypertensive agent, lowers the serum potassium for most patients, sometimes to levels low enough to cause confusion in the diagnosis of primary aldosteronism. The physician must be on guard against this type of iatrogenic hypokalemia.

In addition to hypokalemia, there may be hypernatremia and alkalosis. Urinary ammonia is high, and the urine is neutral or alkaline.

Determination of aldosterone in the urine is difficult and time-consuming and, unfortunately, not very specific. Normal levels have been reported with the characteristic syndrome and a proved tumor.⁸ On the other hand, elevated levels of aldosterone have been found in the urine of patients with congestive heart failure, cirrhosis, and nephrosis and even in normal patients whose intake of sodium was restricted.^{9,10} It is essential, therefore, that patients be on unrestricted sodium diets when urine is collected for this test.

Chronic renal disease may produce abnormalities in serum electrolytes which are similar to those produced by primary aldosteronism, and primary aldosteronism, if untreated, may result in chronic and irreversible renal damage. A most difficult diagnostic problem, then, is to differentiate between primary aldosteronism with secondary renal damage and primary renal disease leading to secondary aldosteronism. Sodium restriction is helpful in this regard, since the urinary sodium usually falls to nearly zero in pri-

mary aldosteronism, but, in chronic renal failure, urinary loss of sodium continues despite sharp reduction of sodium intake.¹¹

At best, knowledge concerning primary aldosteronism is as incomplete as it is recent, and surgical exploration will be necessary for diagnosis in equivocal cases until this problem is understood better.

In most cases reported so far, aldosteronism is due to adrenal cortical adenomas, and resection corrects the abnormal serum electrolytes and usually alleviates the hypertension, though not always permanently. In rare cases, aldosteronism has been associated with malignant adrenal cortical tumors,¹⁰ and, in some cases, hyperplasia without tumors has been encountered.¹¹ Subtotal resection of the adrenal glands is recommended for hyperplasia.

UNILATERAL RENAL DISEASE

Finally, in the search for curable causes of hypertension, the kidney should be considered. For many years, it has been recognized that bilateral renal disease, such as chronic glomerulonephritis or chronic pyelonephritis, is frequently associated with hypertension. But, only when disease is confined to one kidney leaving the opposite one unaffected is hypertension potentially remediable by surgical means. Unilateral renal disease as a cause for hypertension is a concept that has been exploited clinically for only the last twenty years. Unilateral renal disease, though rare, is the most common single cause for potentially curable hypertension.

This condition can best be discussed by dividing it into (1) parenchymal disease and (2) occlusive disease of the renal artery.

Parenchymal disease. This includes chronic atrophic pyelonephritis, hydronephrosis, tuberculosis, calcareous pyelonephritis, renal cysts, pyonephrosis, and renal carcinoma.

In the majority of cases, the history and physical examination fail to give any leads directing attention to unilateral renal disease as a cause of hypertension. This is why intravenous pyelograms are advocated for every patient who does not have azotemia and whose hypertensive vascular disease is severe enough and whose general condition is sufficiently good to warrant surgical treatment if a remediable lesion of one kidney is discovered.

Our experience indicates that approximately 50 per cent of patients with chronic atrophic pyelonephritis benefit from nephrectomy in that the blood pressure is significantly reduced for as long as fifteen years.^{12,13} Approximately 30 per cent remain normotensive. Results from

nephrectomy for other types of unilateral renal disease are not as satisfactory¹³ but are still good enough to justify the risk of nephrectomy in patients whose hypertensive disease is sufficiently severe to present a problem in management.

Unfortunately, there is no way to predict in advance which patients will derive benefit from nephrectomy. In general, the more severe the renal disease, the more likely that nephrectomy will reduce blood pressure, but there are many exceptions. The longer the hypertension has existed, the less the chance that improvement will follow nephrectomy; but, again, there are enough exceptions to justify obtaining routine intravenous pyelograms regardless of the duration of the hypertension. Surprisingly, the age of the patient seems to have little bearing on the result obtained by nephrectomy. In general, patients with hypertensive changes in the retina of groups 1 and 2 are more apt to be helped than patients with changes of groups 3 and 4.

The only absolute contraindication to nephrectomy is impaired function of the opposite kidney. On the other hand, removal of a relatively normal kidney or a diseased kidney is scarcely justified if the hypertension is not severe enough to pose a problem in management, unless, of course, there are urologic indications for nephrectomy over and above the hypertensive disease.

Occlusive disease of a renal artery. Recently, Poutasse and Dustan^{14,15} have shown that partial or complete occlusion of the renal artery can lead to reversible hypertension.

The typical patient with this syndrome reveals a history of sudden onset of severe pain in the flank which lasts a day or two and is sometimes accompanied by hematuria. Hypertension is first discovered shortly thereafter or pre-existing hypertension becomes more severe and difficult to control. Most patients with this syndrome, however, fail to give this characteristic history suggesting renal disease, and the clue to diagnosis is derived from an intravenous pyelogram ordered as a routine procedure for patients with hypertension.

The affected kidney usually shows poor or delayed function and is smaller than its mate. Sometimes the dye appears promptly and in good concentration in the affected kidney, and a minimal disparity in size (measured from pole to pole) on the pyelogram between the two kidneys is the only indication of pathologic lesions in the kidneys. Poutasse¹⁴ stated that any difference in length greater than 1 cm. must be regarded with suspicion.

Retrograde studies of renal function are also

helpful in detecting a partially ischemic kidney. The volume of urine excreted per unit of time by the affected kidney is less than that excreted by the normal kidney. Moreover, the concentration of solutes may be less on the affected side.

Confirmation of the diagnosis depends on visualization or nonvisualization of the renal arteries and their branches by translumbar aortography.

Strange as it may seem, the excretory urogram may be absolutely normal in spite of occlusive disease of a renal artery or its branches. Such conditions will not be discovered unless aortography is routinely performed for all patients with hypertension—a highly impractical if not impossible feat.

However, Poutasse and Dustan¹⁵ advocated routine aortograms for (1) hypertensive patients less than 35 years of age with no family history of hypertension; (2) for hypertensive patients over 55 years of age in whom the syndrome of malignant hypertension develops; and (3) for hypertensive patients at any age who suddenly experience an exacerbation or rapid progression of their disease, especially if preceded by an episode of pain in the flank.

Treatment is surgical. If possible, direct arterial surgery to replace or bypass the obstructed renal artery is the procedure of choice since it preserves the kidney. If this is not technically feasible, nephrectomy is carried out, provided, of course, that the opposite kidney is normal. Bilateral disease of the renal arteries has been successfully treated with reconstructive arterial surgery on both sides or on one side followed by nephrectomy on the other. The hypertension usually remits or is significantly ameliorated if an ischemic kidney is removed or its circulation is restored.

SUMMARY

Every hypertensive patient whose disease is severe enough to warrant treatment and whose general condition is such that surgical procedures are not contraindicated deserves a thorough search for causes that are potentially curable. The history can be extremely helpful in ferreting out those patients with pheochromocytoma and primary aldosteronism. It is moderately helpful in detecting Cushing's syndrome and occlusive disease of a renal artery. It is of least value in coarctation of the aorta and unilateral disease of the renal parenchyma.

In most cases, Cushing's syndrome and coarctation of the aorta are brought to light during a careful physical examination. Physical examination is of less value in the other conditions.

Since many cases of secondary hypertension escape detection in spite of a carefully elicited history and careful examination, certain laboratory aids should be resorted to more or less routinely for every hypertensive patient.

In the final analysis, even the most expert physician finds potentially curable lesions in less than 5 per cent of hypertensive patients, and many of these patients fail to derive the desired benefit from surgical treatment.

Though the search is arduous and the yield low, lives can be saved and disability prevented by the conscientious physician who persists in seeking curable causes of hypertension.

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PATIENTS WITH PARKINSONISM should be examined for possible hyperthyroidism, since treatment of the metabolic abnormality also alleviates symptoms of parkinsonism.

In patients with hyperthyroidism and parkinsonism, symptoms of the latter predominate. However, loss of weight and strength, heat intolerance, skin flush, increased sweating, emotional lability, widened palpebral fissures, fixed stare, tachycardia, and tremor are pathognomonic of both diseases. Tremor in parkinsonism is coarse, irregular, and nonintentional and usually disappears during sleep and increases during emotional excitement. In hyperthyroidism, tremor is fine, rhythmic, and intensified by extending the arms and spreading the fingers. Increased appetite and velvety smooth, warm, moist skin are characteristic of hyperthyroidism but not of parkinsonism. Thyrotoxic myopathy, which occurs only in hyperthyroidism, improves rapidly after function of the thyroid gland is restored to normal.

Radioactive-iodine uptake studies, serum protein-bound iodine determinations, and basal metabolic tests help establish diagnosis of hyperthyroidism accompanying parkinsonism. As a final procedure in questionable cases, the basal metabolic test using thiopental sodium (Pentothal Sodium) anesthesia is the most practical, inducing a perfect basal state void of all nervous and muscular factors. After administration of Pentothal Sodium, metabolic rate drops about 8 per cent in healthy persons but varies little in hyperthyroid patients. The usual amount of Pentothal Sodium necessary to induce sleep is 0.5 gm. in healthy persons and as much as 2 gm. in patients with hyperthyroidism.

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Premature Resort to X-Ray Therapy

A Common Error in Treatment of Carcinoma of the Thyroid Gland

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PATIENTS WITH papillary or follicular carcinoma of the thyroid gland may live a relatively long time with or without aggressive treatment.^{1,2} It is not our purpose here to discuss whether or not treatment of such patients should be attempted. However, we do believe that if treatment is attempted, as much neoplastic tissue as possible should be removed short of mutilation of the host. A logical sequence of therapy is excision of suspicious thyroid tumor and sampling of jugular nodes for frozen section examination, total thyroidectomy if the thyroid gland is found to contain carcinoma, modified radical neck dissection if the cervical chain of nodes contains carcinoma, I¹³¹ therapy if concentration of iodine by thyroid tissue persists, and x-ray therapy if or when no iodine concentration is demonstrated when carcinoma is known to persist.

The position of University Hospital at Ann Arbor as a referral center gave us an opportunity to try to answer 2 questions: (1) In practice, does x-ray therapy usually follow surgical extirpation and I¹³¹ therapy? (2) Is the patient any worse off by having x-ray therapy before surgery and I¹³¹?

METHODS AND MATERIAL

Forty-two patients who had received x-ray therapy for carcinoma of the thyroid gland were seen in the Clinical Radioisotope Unit of University Hospital between September 1947 and May 1957 and form the subject material for this report. For statistical purposes, the study was considered closed as of May 1957. Thus, in subgroup IIa, which is described later, the last report used in calculations of survival, follow-up, and so forth represents the last report before the closing date

of the study, even though in several cases, still later reports showed that the patients were doing well. In no instance do we know of a death occurring after the closing date. Microscopic pathologic confirmation of the diagnosis was a prerequisite for inclusion of a patient in this study. One author personally observed each patient, and many of the subjects have also been followed by one or both of the other authors. Those patients who had been subjected to the logical sequence of treatment previously outlined were classified as group I. Patients exposed to x-ray therapy before surgical or I¹³¹ ablation of thyroid tissue were classified as group II, subject to the following exceptions: (a) failure to use I¹³¹ before 1948 was never classified as an error, (b) no patients with histologic diagnoses other than follicular and papillary adenocarcinoma were included in group II, and (c) the surgeon's judgment was accepted without question regarding limited extirpation. The principal criterion of incomplete surgical effort was failure even to attempt a total thyroidectomy. Patients thus eliminated from group II were added to group I.

Patients in group II were further put in subgroup IIa if their course after x-ray therapy had clearly shown that they had actually suffered ill effects because x-ray therapy had been prematurely administered before indicated surgery and/or I¹³¹ therapy. Criteria for judging whether the patient had suffered such ill effects were: (1) localization techniques at some time after x-ray therapy's completion showed metastatic neoplasm concentrating I¹³¹ in every case except 11, the area of uptake being definitely metastatic and not merely thyroid bed; (2) subsequent surgery and/or I¹³¹ therapy gave objective benefit, at the minimum a decrease in metastatic neoplasm concentrating I¹³¹; (3) the general condition was never worse after this local evidence of successful treatment; (4) all patients were alive and active within the last year.

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RESULTS

Of the 42 patients in this series, 18 or 40 per cent, fell in group I and 25, or 60 per cent, in group II. Of the patients in group II, 13 or 31 per cent of the entire series, fell in subgroup IIa. Our last follow-up report was less than five months before the close of the study in 11 patients and not more than ten months before close of the study in any patients in subgroup IIa.

The following results were obtained when I^{131} therapy, with or without further surgery, was instituted after x-ray therapy in the 13 patients in subgroup IIa. Five had additional surgery before I^{131} uptake in metastases was shown. Metastatic neoplasm concentrating I^{131} disappeared in 12 and decreased in 1. Eight exhibited further objective evidence that I^{131} therapy, with or without surgery, was followed by regression of metastases as judged by palpation of the neck, x-ray films of the lungs, or both. X-ray evidence of pulmonary metastases disappeared in 2 and decreased in 2. Palpable metastases disappeared in 4 and decreased in 3. The regression of palpable metastases followed I^{131} therapy alone in 6 of these 7 and followed combined surgical and I^{131} attack in the remaining patient. One patient whose palpable metastases disappeared only as an obvious and direct result of surgery has not been included in the aforementioned 8.

The mean survival time of subgroup IIa between the date the diagnosis was established and date of the last report was six and one-half years, with a range of two to ten years.

In 11 patients in subgroup IIa, records of the total dose of x-ray received were obtained from the roentgenologists giving the treatment. The mean of these total doses was 5,055 r (standard deviation $\pm 2,630$ r) measured in air. Although the majority of the patients were given daily doses for several weeks until the course of radiation was completed, a few received divided courses of treatment at widely separated intervals. It is, therefore, recognized that this mean figure probably does not have precise significance. We merely wish to show that the patients received a reasonable amount of x-ray. The decision to rely on x-ray therapy was made while 11 of the patients in subgroup IIa were under the direction of teaching or large city hospitals. This decision was made after 1947 in 20 patients in group II, including 12 in subgroup IIa, and after 1951 in 12 patients in group II, including 5 in subgroup IIa.

Data on the individual patients in subgroup IIa are summarized in table 1.

The following summaries of 3 illustrative cases

emphasize the importance of carrying out surgery and I^{131} treatment before x-ray therapy.

Case 1. D. T., a 14-year-old girl, was found to have a tumor in the region of the right jugular chain of nodes in 1947 during a routine physical examination. No diagnostic or therapeutic measure was carried out. Eighteen months later, a left axillary lymph node was palpated, biopsied, and reported as showing no evidence of carcinoma. In June 1949, lymph nodes removed from each of the jugular chains were found to be the site of metastatic adenocarcinoma of the thyroid gland. The parents were allegedly told that surgery would involve resection of the trachea, and x-ray therapy and I^{131} were advised and given. The patient received "20 treatments, maximum dosage." The lymph nodes had been removed after a tracer of I^{131} and by absolute beta assay were found to concentrate I^{131} well. Unfortunately, the patient was given only 65 mc. of I^{131} in 2 divided doses in a medical school hospital elsewhere during August and September of 1949. The patient was asymptomatic and, on repeated check-ups, was considered well. During her senior year of nursing school at our University Hospital, she consulted one of the authors even though she was asymptomatic. Her scintiscan (figure 1a) in June 1954 showed good uptake in the region of both lobes of the thyroid gland and apparently some uptake lateral to the thyroid gland, presumably in cervical lymph nodes.

A radiogram of the chest showed that accentuated vascular markings read on her chest roentgenograms since 1950 were now beaded in appearance, suggesting carcinoma of the thyroid gland metastatic to the lungs. At surgery in August 1954, complete resection was impossible because of solid involvement of most of the lateral structures of the neck. A wedge-shaped sagittal block of hard fibrous tissue surrounding the trachea was resected, thus freeing the trachea. The histologic diagnosis was moderately well-differentiated follicular and papillary carcinoma of the thyroid. In February 1955, after 3 months of propylthiouracil therapy, a scintiscan showed uptake in the jugular lymph node areas (figure 1b) and probably in the left lower chest posteriorly. Accordingly, the patient was given 145 mc. of I^{131} . By May 1955, no I^{131} concentration could be demonstrated in the neck (figure 1c). The chest radiogram, however, was reported as still showing "bilateral nodularity in both lower lungs, probably due to metastatic neoplasm from carcinoma of the thyroid." According to the scintiscan, there was questionable localization of I^{131} in the region of the lung metastases, and the patient was not yet myxedematous. Accordingly, she was given 165 mc. of I^{131} . In August 1955, the metastases had decreased in size and number, and the patient was totally myxedematous. She was put on desiccated thyroid medication, and the dosage was raised to 3 gr. per day. She later gave birth to a normal child. Her last chest radiogram, January 1957, was read by the Department of Radiology as negative. There was no visible or palpable thyroid tissue or carcinoma in the neck. The scintiscan taken six weeks after she had ceased taking thyroid, showed no localization of I^{131} in neck (figure 1d) or chest.

Case 2. M. I., born in 1931, received a total of 1,800 r of x-ray irradiation for tumors in the right jugular area in 1943 and 1945 with no regression of the tumor. In 1947, a biopsy of the right cervical tumor mass revealed "a somewhat undifferentiated adenocarcinoma of the thyroid, infiltrating adjacent tissue." A recurrent tumor in this area was excised in 1948. In

TABLE 1
Summary of 13 Patients with Follicular or Papillary Carcinoma of the Thyroid Gland Who
Had Neoplasm Concentrating I¹³¹ Remaining after X-ray Therapy and Who Benefited
from Further I¹³¹ and Surgical Treatment

Case	Pt.	Race	Sex	Age at time of diagnosis	Year of diagnosis	Surgery (other than biopsy) and I ¹³¹ studies or treatment before x-ray Rx.	X-ray Rx (Dose date)	Evidence of metastatic neoplasm after x-ray Rx
1	DT	W	F	16	1949	None	"Maximum" 1949	Uptake in cervical nodes in 1949 and 1954; metastases in cervical nodes palpable and confirmed at operation in 1954; lung metastases in 1954-1955
2	MI	W	F	16	1947	None	1,800 r (total) 1943 and 1945	Uptake in cervical nodes, palpable cervical metastases, lung metastases, and possible rt. vocal cord involvement in 1950
3	EH	W	F	14	1952	Scan before surgery, total thyroidectomy, rt. radical neck dissection in 1952	6,000 r 1952	Uptake in cervical nodes, palpable cervical metastases in 1952
4	AI	W	M	11	1946	None	2,400 r 1946	Recurrent cancer in neck found at operation in 1948; uptake in cervical nodes in 1950; palpable cervical metastases in 1950
5	GS	W	F	33	1948	Subtotal thyroidectomy in 1948	6,100 r 1948	Uptake in cervical nodes in 1954; lung metastases in 1954
6	HR	W	M	37	1952	Uptake study in 1952	5,500 r 1952	Uptake in cervical nodes in 1954; uptake in lung metastases in 1954
7	D VanB	W	M	7	1950	Total thyroidectomy in 1950, rt. radical neck dissection in 1951	"20 treatments" 1951	Uptake in cervical nodes in 1951; palpable cervical metastases in 1951
8	VJ	W	M	62	1948	Subtotal thyroidectomy in 1948, excision of recurrent cancer in 1950	6,575 r 1948 4,875 r 1950	Uptake in cervical nodes in 1952; palpable metastases in 1952; metastases found at operation in 1953, 1954, 1955
9	DE	W	M	38	1952	Subtotal thyroidectomy in 1952, excision of remaining thyroid and radical neck dissection in 1952	4,150 r 1952	Uptake in cervical nodes in 1953
10	GP	W	M	53	1951	Uptake study before total thyroidectomy and left radical neck dissection in 1951	5,600 r 1952	Uptake in cervical nodes, probable palpable cervical metastases, cervical metastases found at operation in 1954
11	ES	W	F	11	1946	Subtotal thyroidectomy	4,000 r 1946	Uptake probable in cervical nodes, cervical metastases palpable and confirmed at operation in 1956
12	WF	W	M	17	1951	Subtotal thyroidectomy in 1951	5,900 r 1951	Uptake in cervical metastases in 1956
13	KP	W	F	44	1954	Subtotal thyroidectomy in 1954, excision of remaining thyroid, radical neck dissection in 1955	2,700 r 1955	Uptake in cervical metastases in 1956

<i>Further Rx after x-ray Rx Surgery type and date</i>	<i>¹³¹I Total dose</i>	<i>¹³¹I uptake in metastases</i>	<i>Results at last report Pulmonary metastases</i>	<i>Palpable metastases</i>	<i>Notes</i>
Subtotal thyroidectomy in 1954	c. 375 mc., 1949-1955	Disappeared	Disappeared	Disappeared	See further comments in text
Total thyroidectomy in 1950	332 mc., 1950-1951	Disappeared	Disappeared	Disappeared	See further comments in text
None	410 mc., 1952-1955	Disappeared	—————	Decreased	
Total thyroidectomy in 1948	142 mc., 1949-1950	Prohahle disappearance	—————	Disappeared	Postoperative bilateral laryngeal adductor palsy and hypoparathyroid
None	c. 310 mc., 1954-1955	Disappeared temporarily. May return	Decreased	Several hard cervical nodes appeared 1956	
Total thyroidectomy in 1953	585 mc., 1954-1955	Decreased	Decreased	Decreased	
None	130 mc., 1951-1952	Disappeared	—————	No Change	
L. rad. neck dissection in 1954, ex. of metastases in 1954, 1955	c. 90 mc., 1953	Disappeared at last ¹³¹ I study 1953	—————	Surgical removal	Developed radiation ulcer of skin of neck
None	100 mc., 1953	Disappeared	—————	—————	
None except further biopsy in 1954	100 mc., 1954	Disappeared	—————	Disappeared	
Excision of cervical metastases in 1956, biopsy (neg.) in 1948	126 mc., 1956	Disappeared	—————	Decreased	
Modified radical neck dissection in 1956	97 mc., 1956	Disappeared	—————	—————	See further comments in text
None	114 mc., 1956	Disappeared	—————	—————	Postoperative hypoparathyroidism

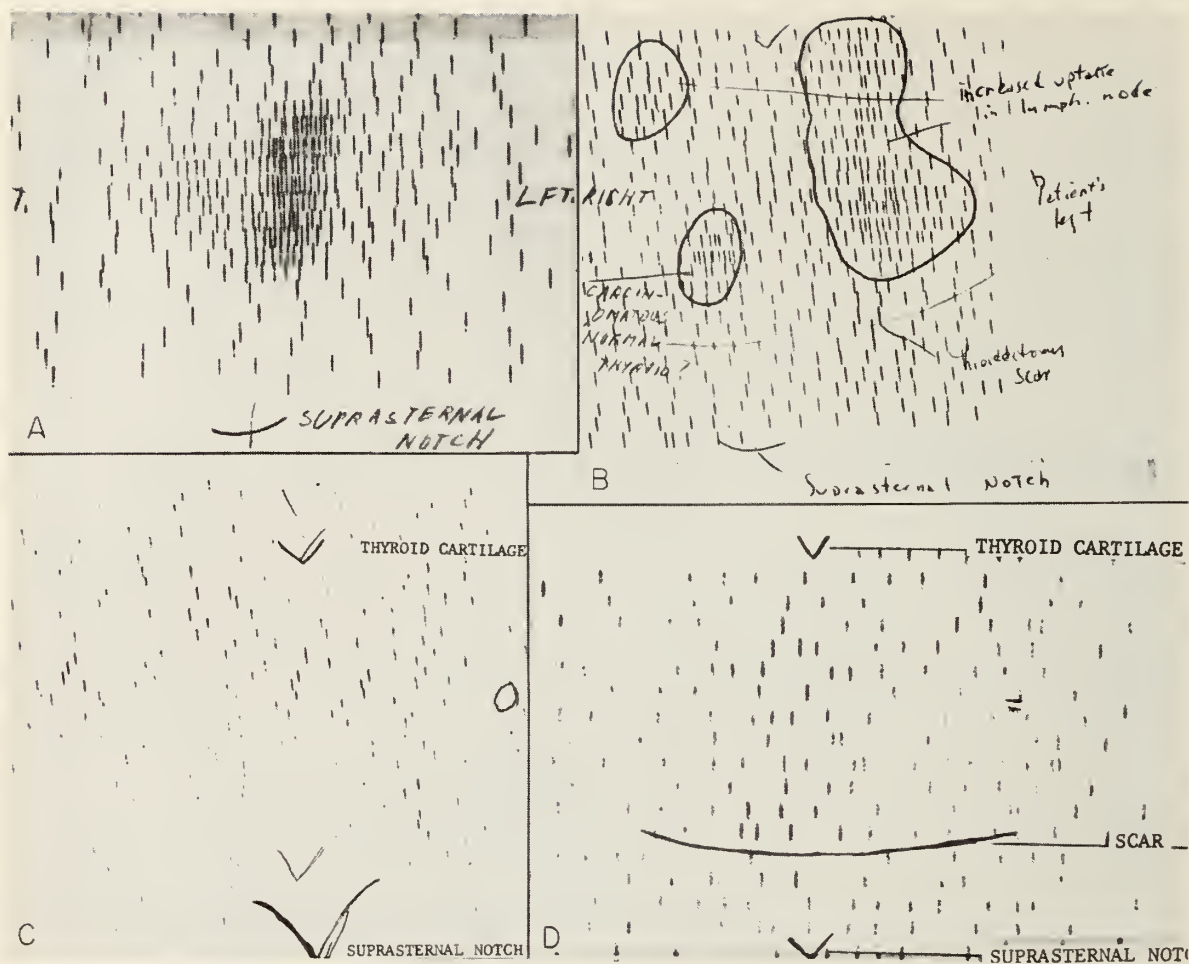


Fig. 1. (Case 1). Serial scintiscans of neck showing regression of cervical metastases after I^{131} treatment (see table 1 and text). (a). June 1954, good uptake in region of both lobes and some uptake lateral to thyroid gland. (b). February 1955, uptake in jugular nodes. (c). May 1955, uptake abolished in jugular node area. (d). February 1957, no uptake in neck after six weeks without thyroid.

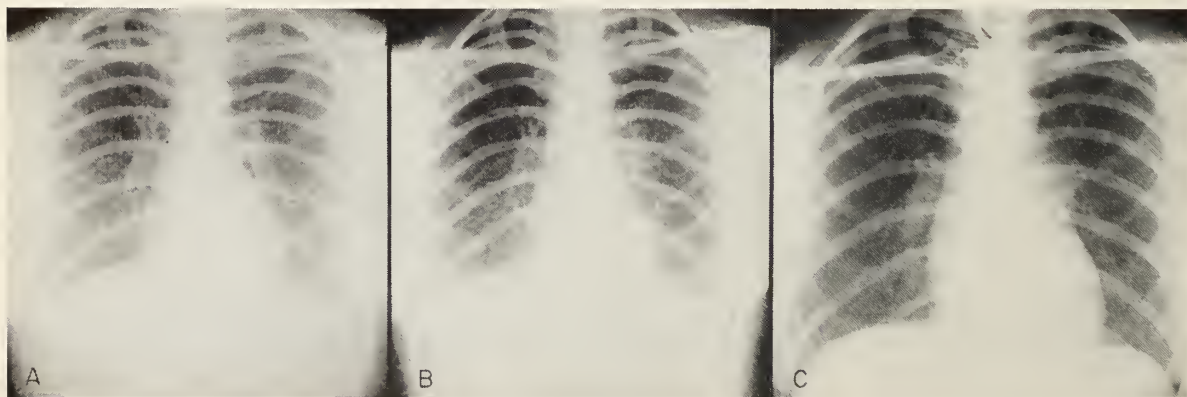


Fig. 2. (Case 2). Roentgenograms showing disappearance of pulmonary metastases after I^{131} treatment (see table 1 and text). (a). October 5, 1948, miliary lesions shown in both lungs. Only prior treatment had been x-ray therapy to neck in 1943 and 1945. (b). October 10, 1950, decrease in number and size of lung metastases. On July 11, 1950, a total thyroidectomy had been performed, and 62 mc. of I^{131} had been given on July 15, 1950. (c). February 8, 1952; patient had received 90 mc. of I^{131} on October 13, 1950, 80 mc. on February 3, 1951, and 100 mc. on June 14, 1951. Further decrease in metastases.

June 1950, re-excision of local nodes was carried out, and chest roentgenograms were reviewed. They showed that miliary lesions had been present in both lungs and progressive since 1948 (figure 2a), presumably metastatic carcinoma from the thyroid gland. In July 1950, we found, in addition, a right vocal cord paralysis and bilateral hard cervical adenopathy in each jugular chain. A total thyroidectomy was performed, but all the lymph nodes could not be resected. The pathologic diagnosis was "papilliferous adenocarcinoma of the thyroid, apparently metastatic to lymph nodes." Localization counting revealed definite uptake in cervical nodes and suggestive localization of I^{131} in the region of pulmonary metastases. Between July 1950 and June 1951, the patient was given a total of 332 mc. of I^{131} in 4 doses. In retrospect, chest roentgenograms demonstrated that the lung metastases decreased in number and size after each treatment dose (figures 2b and 2c). The patient was totally myxedematous by September 1951 and showed no further significant uptake in cervical lymph nodes or lungs. She was, therefore, put on desiccated thyroid. Palpable cervical lymphadenopathy disappeared by February 1952. The chest roentgenogram was read as normal by the Department of Radiology by August 1955. The patient has remained entirely well and has had normal chest roentgenograms and delivered 2 normal children as of December 1956.

Case 12. W. F., a 17-year-old boy, was found to have a solitary thyroid nodule on routine physical examination in July 1951. A moderately well-differentiated adenocarcinoma with lymph node metastases was discovered by subtotal thyroidectomy on August 31, 1951. No effort was made to have I^{131} localization studies performed. Instead, a total of 5,900 r of x-ray irradiation was applied to his neck starting on September 7, 1951. The patient was referred asymptomatic to the Clinical Radioisotope Unit in September 1956 for a routine check-up. Localization of I^{131} was present in the thyroid gland region and in the jugular node area at the level of the left angle of the mandible. A left radical neck dissection was performed, and 97 mc. of I^{131} was administered for residual concentration of I^{131} . In March 1957, a scintiscan showed no evidence of I^{131} localization in the neck.

COMMENT

As our study was restricted to patients seen in the radioisotope unit of a hospital that is primarily a referral center, our statistics are probably biased. We are apt to see patients with thyroid cancer if they are not doing well under treatment elsewhere or if the physician concerned with their management feels that some possible benefit may be gained from I^{131} therapy. Nevertheless, it is somewhat disheartening to find that, whereas many patients with tumors are likely to benefit from a plan of treatment that logically removes as much thyroid tissue as possible and attempts to obtain useful concentrations of I^{131} in remaining neoplasm, these principles of treatment are honored more in the breach than in the observance, even in recent years.

It is, of course, quite unlikely that we studied all patients at the exact time they showed the maximum benefit from x-ray therapy. In a few

instances, I^{131} uptake studies may have been carried out before there was time for the patients to show maximum benefit from x-ray therapy, and, in several cases, such treatment may have helped control metastases for a considerable period of time before we saw the patients. Furthermore, it cannot be claimed that destruction of all neoplasm concentrating I^{131} is equivalent to destroying all neoplasm. Logically, however, it is a step in the right direction. Nevertheless, about one-third of our patients to whom x-ray therapy had been given before maximum use had been made of surgical and I^{131} therapy subsequently had metastases which responded to some degree—and, at times, to a striking degree—to completion of surgical and I^{131} therapy. Therefore, we strongly suspect that surgical and I^{131} therapy should be completed in these patients before x-ray therapy is begun.

We have attempted no comparison between I^{131} and surgery, as we do not consider these in any way competitive.

Absolutely no personal criticism of physicians giving x-ray therapy is intended. The decisions to discontinue surgical and I^{131} therapy are not usually made by the radiologists.

SUMMARY

1. The logical sequence of therapy in attempting to extirpate papillary or follicular carcinoma of the thyroid should be removal of as much normal and neoplastic thyroid tissue as possible without mutilating the host, I^{131} therapy if concentration of I^{131} persists, and x-ray therapy if residual carcinoma is then suspected.

2. In 25 of 42 patients who had received x-ray therapy for thyroid cancer, it had been given before completion of surgical and I^{131} treatment.

3. In 13 of these 25 patients, metastatic neoplasm concentrating I^{131} was present after x-ray therapy and absent or decreased after subsequent I^{131} and surgical treatment. Eight patients had further objective evidence of regression of metastases after I^{131} and surgical treatment were completed. Pulmonary metastases disappeared in 2 and decreased in 2; palpable metastases disappeared in 4 and decreased in 3.

4. These results suggest that the sequence of treatment outlined in paragraph 1 has merit.

Expenses of this study were defrayed in part by grants from the Michigan Memorial Phoenix Project, an American Cancer Society institutional grant, and the Helen Wolter Memorial Cancer Fund.

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Observations on Prevention of Death in the Neonatal Period

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AS CAN BE SEEN from table 1, statistics having to do with the causes of death in the neonatal period are very much the same in this country as in Great Britain provided autopsy rates are high. Where autopsies on dead newborn infants are infrequently performed, an accurate diagnosis is often impossible. Clinical and autopsy diagnoses are likely to be at variance about 40 per cent of the time. An infant may die with a clinical diagnosis of respiratory failure due to atelectasis and at post mortem be found to have pneumonia. We have seen an infant in whom intracranial hemorrhage was diagnosed before death show severe malformation of the aorta with no pathology in the brain at autopsy.

If we are interested in preventing needless deaths in the first week of life, we must first know as accurately as possible the actual cause of death. Then, by reviewing all the information obtainable about the pregnancy in question and any preceding pregnancies, the labor room record, the appearance of the baby and the placenta at birth, and the nursery record, we must determine whether the death was preventable or not.

If it is decided that the death could have been prevented, all the relevant data should be reviewed at a meeting of the medical staff to be sure that adequate steps will be taken to minimize the likelihood of such a death occurring again. Particular care must be taken to see that available knowledge is efficiently applied and that the standards of medical and nursing care are the best possible.

Since April 1954, a perinatal mortality study group, consisting of a pediatrician as chairman and representatives from the Departments of Pathology, Obstetrics, and Pediatrics at the University of Manitoba, has conducted a study of

the cause and prevention of perinatal deaths in Winnipeg. All babies born in 2 large general hospitals, averaging a total of approximately 7,000 births per year, were included in the study.

An effort was made to obtain all the information possible in regard to every pregnancy. When an infant died, every effort was made to obtain permission for an autopsy. The autopsy rate has varied from 92 to 95 per cent during the period of study, 1954 to 1957. Autopsies were done by personnel interested in and familiar with the pathology of the newborn infant. All information obtained about each infant who died was then assembled, recorded on punch cards, and discussed by the study group. In conference with the head of the Obstetrical Department of each hospital, a temporary classification regarding preventability was agreed upon. The classification used was similar to that introduced by Kendall and Rose¹ (table 2).

Thus, for example, when an infant died as the result of multiple congenital malformations, he was classified as obstetric, nonpreventable, and unavoidable (code A-II-6). On the other hand, if an infant died of erythroblastosis because the physician failed to recognize such a possibility in spite of regular prenatal attendance by the mother and had delayed diagnosis and instituted treatment too late to save the life, the case was then classified as obstetric and preventable, with the physician at fault because of error in judgment (code A-I-3).

Each infant's death was reviewed at a regular combined obstetric-pediatric meeting attended by the physicians concerned in the cases. Every opportunity was given to the physician to add or correct information in our records. The classification agreed upon by the study group was then put to a vote, and the result was recorded. The spirit of these meetings can best be understood by realizing that these conferences are designed to determine *preventability*, not *culpability*. In many instances, a physician voluntarily suggested that a particular neonatal death was preventable and indicated the course he would fol-

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TABLE 1
ANATOMIC CAUSES OF DEATH IN DIFFERENT STUDIES

<i>Postmortem Findings*</i>	<i>Chicago Areal per cent</i>	<i>New York Areal per cent</i>	<i>London† Hospital per cent</i>	<i>Winnipeg Hospital per cent</i>
Abnormal pulmonary ventilation and diffusion	47.5	40.0	26.6	27.7
Malformations	13.5	19.0	15.0	14.4
Anoxia	4.2	5.0	5.0	13.8
Infection	10.0	5.0	12.2	12.6
Hemolytic disease	—	10.5	3.2	6.6
Trauma	18.3	17.0	18.1	6.0
Miscellaneous	1.0	—	5.4	5.4
Inconclusive and unknown	—	4.0	—	7.8
Per cent of prematures	79.1	54.2	71.8	68.0
Total deaths	10,000	955	221	160
Per cent of autopsies in series as a whole	89.0	35.0	100.0	92.0

*All figures for anatomic causes of death quoted in these cases are from autopsies only.

†The London study was a pure autopsy study.

TABLE 2
PHILADELPHIA CLASSIFICATION

A — Obstetric	I — Preventable	1. Inadequate prenatal care
B — Pediatric	II — Nonpreventable	2. Family at fault
C — Combined	III — Unclassifiable	3. Physician, error in judgment
		4. Physician, error in technic
		5. Intercurrent disease
		6. Unavoidable disaster

low if such a ease were to come under his care in the future. These meetings have proved educational and informative as well as serving the original purpose of pinpointing preventable perinatal deaths.

Out of 148 deaths in one of the hospitals, 19 were considered preventable. It is of interest that preventability was more often associated with the death of a full-term rather than a premature infant.

PREMATURITY AS A FACTOR IN NEONATAL MORTALITY

Most newborn deaths occur in infants weighing 5 lb. or less at birth. Although about 7 per cent of births in Winnipeg are premature, over 60 per cent of all neonatal deaths occur in this group. Most of these deaths are due to respiratory failure associated with hyaline membrane formation, pulmonary atelectasis, or organ immaturity. Little can be done to prevent death in this group in the light of our present knowledge. If prematurity could be prevented, fewer newborn deaths would occur. Prematurity related to toxemia, placenta previa, twin pregnancy, and malnutrition can be controlled to some extent, and the number of infant survivors in this

group is increasing. Prematurity can hardly be prevented in the 60 or 70 per cent of cases in which the cause of premature onset of labor is not even known.

Death of the full-term baby is much more often preventable. This is borne out by our own experience and by the New York study as well. This is the group that merits our closest attention.

PREVENTABLE CAUSES OF NEONATAL DEATH

In general, the area of preventability was found to be one or more of the following:

1. *Inadequate prenatal care* due to neglect on the part of the patient and her family or difficulties in making regular visits to the physician as the result of economic or geographic factors. We must make sure that there is no obstacle in the way of adequate prenatal care. If cases of toxemia, placenta previa, and erythroblastosis are to be recognized early enough to ensure the best possible care, regular prenatal care is imperative. Not only must health departments make sure that no one regardless of economic status or geographic isolation is denied this care, but physicians must take steps to ensure that the prenatal examination is thorough and consists of

TABLE 3
APGAR² RATING

<i>Sign</i>	<i>0</i>	<i>1</i>	<i>2</i>
Heart rate	Absent	Slow, below 100	Over 100
Respiratory effort	Absent	Slow, irregular	Good crying
Muscle tone	Limp	Some flexion of extremities	Active motion
Response to catheter in nostril (tested after oropharynx is clear)	No response	Grimace	Cough or sneeze
Color	Blue, pale	Body pink, extremities blue	Completely pink

more than having a nonmedical person weigh the patient and check the blood pressure and urine.

2. *Failure to recognize in the newborn signs of treatable diseases*, such as pneumonia, erythroblastosis, congenital obstruction, or cardiac failure.

An alert, efficient nursing and resident staff are recognized essentials in any hospital which cares for newborn infants. It is important to set up a system which ensures careful observation of newborns from the moment of birth and prompt recognition of important deviations from normal, such as jaundice in the first twenty-four hours, pallor, repeated vomiting, and respiratory distress.

We have found Apgar's² system of scoring the infant (table 3) to be a most valuable device to ensure not only a reasonably careful assessment of the infant at the time of delivery but also, and perhaps even more important, to focus nursing and medical attention on those infants who are most in need of observation and in whom abnormal conditions are most likely to develop during their nursery stay.

The scoring is recorded sixty seconds after birth and may be done by anyone present at the delivery — obstetrician, anesthetist, houseman, or graduate nurse. The infant is examined and rated according to color, breathing, heart rate, response to stimulus, and activity. A score of 0, 1, or 2 is assigned as shown on the table. It has been our experience that infants rating 6 or higher rarely experience difficulty. On the other hand, infants rating 2, 3, or 4 contribute to nursery morbidity and mortality.

The sixty-second score is of interest later to the physician dealing with an infant who seems retarded or has convulsive episodes. It may help a good deal in deciding whether the problem arose postnatally or antenatally if the infant's condition and responsiveness at birth are known

with reasonable reliability. Too often nursery records are inadequate, and the labor room record may hardly mention the infant.

By means of formal teaching and conferences, the nursing and house staffs must be taught the importance of careful observation and the necessity of drawing the physician's attention to changes in the infant's condition which may indicate serious trouble. In this way, treatable surgical obstructions, previously unsuspected hemolytic disease, and infection may be quickly recognized and lives saved as a result.

3. *Infection in the newborn* accounts for 10 to 12 per cent of neonatal deaths in spite of advances in antibiotic therapy. Infection is usually acquired prenatally and often takes the form of "intrauterine" pneumonia. If infant deaths due to this cause are to be reduced, treatment must be on a prophylactic basis and by "anticipation." Deaths due to intrauterine pneumonia occur within a matter of hours after birth. Treatment must therefore start from the moment of birth or should be given to the mother before the baby is born if conditions favor the development of intrauterine infection of the fetus.

What are these conditions? In general, infection can reach the fetus in 1 of 3 possible ways:

1. by blood stream spread — maternal bacteremia
2. by vaginal route — ruptured membranes
3. by vaginal route — intact membranes.

Maternal sepsis and blood stream infection of the fetus probably occur infrequently, but, nevertheless, antibiotics should be given to any woman at term who is febrile if there is any suspicion of a bacterial cause for the infection.

When membranes are ruptured for eighteen hours or more before labor commences, the possibility of ascending infection of fetal membranes and amniotic fluid must be seriously entertained. It is generally considered that infection does not become a practical problem until such a patient

actually goes into labor, but from that point on, the risk to the infant increases with the length of the labor. Blanc³ has pointed out that in about 30 per cent of cases of intrauterine pneumonia, membranes are intact at the onset of labor but become considerably thinned and probably less resistant to infection from below as the result of a prolonged and difficult labor.

For several months, we have followed a plan of prophylaxis which is instituted at the moment of birth in all cases which present one or more of the following features at delivery: (1) maternal fever due to any cause, (2) membranes ruptured more than eighteen hours, (3) foul or murky amniotic fluid, (4) prolonged or difficult labor, and (5) excessive obstetric manipulation or instrumentation.

Under these circumstances, 20,000 units of crystalline penicillin is given every four hours, 30 mg. per pound of streptomycin every twelve hours, and 60 mg. per pound of chloramphenicol every six hours. Treatment may be discontinued at any time by the attending physician or continued after forty-eight hours with his approval. This method ensures prompt institution of treatment without waiting for evidence of neonatal illness. In the case of premature rupture of membranes, the mother should be treated in this manner at the onset of labor.

We would like to be able to say that the use of this prophylactic regime has reduced mortality from prenatally acquired infection. We are forced to admit that up until now we have been disappointed with the results achieved. We have had instances of death on the third or fourth day from intrauterine pneumonia related to premature rupture of membranes with proved amnionitis and placentitis in spite of the application of the above routine from the moment of birth. It seems evident that neither the choice of antibiotic, the time it is given, nor the dosage will solve the problem. The state of development of neonatal immune mechanisms and humoral as well as cellular mechanisms may play a very important part in the ability of the baby to cope with infection. Studies into the mechanisms of phagocytosis in the newborn and the role of passive antibody and the Properdin system are not far enough advanced to permit application of this newly acquired knowledge to the management of infection in the newborn infant.

Postnatally, acquired infection responds more favorably to treatment, provided the diagnosis is made early enough. One must not wait for the usual signs of illness caused by infection. Fever is often absent. The development of listlessness, anorexia, or periodic apneic spells may

indicate sepsis in a newborn infant. A high index of suspicion is of the greatest value. Better to treat a few infants unnecessarily than to overlook infection as the cause of illness in a newborn infant.

We have had several preventable deaths in newborns who were born uneventfully and then, after a day or two of apparently normal progress, became listless and anorexic, and finally cyanotic spells or convulsive episodes developed before they died. At autopsy, sepsis alone was demonstrated as the cause of death. The clinical diagnosis in one such case was heart failure and in another intracranial hemorrhage.

4. *Erythroblastosis* accounted for 6.6 per cent of our neonatal deaths. Deaths from erythroblastosis are largely preventable, provided an efficient system is in operation which permits (1) early identification of Rh mothers, (2) careful checking of antibody levels throughout the pregnancy, and (3) attendance by an experienced "transfusion officer" at the birth of a baby who is apt to be affected.

Case finding in the Province of Manitoba is supervised by the Blood Group Laboratory, which is housed in the Maternity Building. Three young, well-trained pediatricians are on call for immediate care of any infant who is born with hemolytic disease caused by blood group incompatibility. Exchanges have been started less than twenty minutes after birth of a severely affected baby. Occasionally, in carefully selected instances and after careful review of the history of the previous pregnancy, early induction is carried out and is followed by prompt exchange transfusion repeated 3 or 4 times if necessary in order to try and salvage a healthy living baby.

4. *Physician at fault* is the category comprising those cases in which an error in judgment or technique on the part of the attending physician contributed to the neonatal death. Such cases include instances in which a cesarean section was indicated in a particular case but for various reasons was not performed, and a neonatal death resulted. Also included in this category are instances of the incorrect use of forceps and the misuse of drugs in the course of labor. It is hardly necessary to state that a high standard of professional competency must be expected of any member of a hospital staff. Review of neonatal deaths by hospital staff physicians will help to ensure that this desirable objective is maintained.

SUMMARY

1. Preventable neonatal deaths still occur.
2. Opportunity for the prevention of neonatal deaths is greatest in full-term infants.

3. Further reduction in premature deaths awaits results of research now in progress.

4. Inadequate prenatal care resulting from maternal ignorance or economic or geographic factors is responsible for neonatal deaths in many instances.

5. A plan is outlined to ensure a high standard of care of the newborn infant with emphasis placed on prompt recognition and appreciation of important signs of illness.

6. Accurate diagnosis of the causes of neonatal deaths and a review by members of the medical staff of each hospital of all the factors concerned

should lead to improved medical care in the perinatal period and to reduction in neonatal mortality.

Statistical material in this paper is derived from the files of the Perinatal Mortality Project conducted in Winnipeg with the assistance of a Dominion-Provincial Health Grant.

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NEONATAL OSTEOMYELITIS differs greatly from acute osteomyelitis in older children. Early symptoms are nonspecific: malaise, failure to gain weight, fever, diarrhea, refusal to move the affected part, local edema, wrist drop, swelling of eyelids, conjunctivitis, purulent discharge from one nostril, thickened gums, and abdominal mass. In contrast to osteomyelitis in older children, toxemia and fever are not found, and the infant continues to eat well.

The bones that were affected most frequently in 24 patients were the femur, maxilla, humerus, and vertebra. Roentgen examination is diagnostic by the time of admission. The most prevalent sign is a large amount of irregular extracortical new bone. Sequestra are prevented by good bone vascularity in infants.

Osteomyelitis of the maxilla, found in one-quarter of the patients, is seldom diagnosed before pus exudes from the sinuses. A swelling in the cheek, infra-orbital area, or eyelid is usually the initial sign and may increase, redden, and become abscessed or fistulous. Faulty deciduous teeth and nasal deformity may result.

Staphylococcus aureus was isolated from all 24 patients and was uniformly resistant to penicillin. Erythromycin should be started immediately, even before diagnosis is confirmed, and continued in large doses for at least three weeks. Pus should be aspirated frequently from joints, soft tissue spaces, and subperiosteal area and replaced with erythromycin in glycerin. Immobilization of affected limbs is vital to prevent deformity, particularly in the hip joint. With early diagnosis and adequate treatment, prognosis is good.

A. MURRAY CLARKE, M.D., Melbourne, Australia. *M. J. Australia* 1:237, 1958.

Uterus Didelphys—a Case Report

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CONGENITAL ANOMALIES of a woman's genital tract are infrequently seen. Most of the reports in the literature are of isolated cases, with the exception of the large series of Fenton and Singh¹ and, most recently, that of Jones. Falls² states that in a patient manifesting an absolute sterility, or habitual abortion at the third to fifth months, a bicornuate uterus must be strongly suspected among other potential causes. The gross fetal wastage approaches 40 per cent and the cesarean section rate 20 per cent. In his review of 107 cases of torsion of the gravid uterus, Nesbitt³ calls attention to the fact that this accident was associated in 15 per cent of these cases with a bicornuate uterus. Most cases of bicornuate uterus deliver without incident, and, therefore, are not recognized. Most authors note an increase in postpartum hemorrhage, premature labor, and abortion.^{1,2,4} Barter⁵ states that the Strassmann unification operation is a valuable procedure in women with anomalous uteri who have had infertility problems or habitual abortions.

A woman's genital tract forms during the first sixteen weeks of intrauterine life by fusion of the 2 müllerian ducts. Canalization occurs, resulting in 1 vagina, 1 cervix, and 1 uterus. Obviously, varying degrees of nonfusion may occur with the resultant duplications of various portions of the internal genitalia. Complete failure of fusion yields the uterus didelphys, or the so-called bicornuate uterus, with double cervix and double vagina. The following is a report of such a case.

CASE REPORT

Mrs. R. S., a 26-year-old white woman, Para 0-0-0-0, had been married five years with an absolute infertility problem. Catamenia was 14+28+4. Her past history revealed that she had a previous infertility work-up, but there was no evidence of tubal patency. A right ovarian cystectomy was done in 1954. The patient was first seen on January 13, 1956, at which time physical examination manifested a double vagina, double cervix, and a double uterus, each side of which could be probed to normal depth. The left vagina was patulous, and the right was of approximately the same depth but not



Fig. 1. Two uteri and left polycystic ovary as seen at laparotomy.

easily examined manually. The left uterus was well visualized by salpingography and showed a patulous, normal appearing patent tube. The right uterus was not cannulated but was probed to normal depth. Basal metabolic rate was +8. Sims-Huhner test revealed active sperm after two hours. Because of religious scruples, a full sperm count was not available. The temperature graph showed ovulation on the thirteenth day, which was corroborated by vaginal smears. Because of the patient's long history of infertility and the physical and laboratory findings, a unification operation was elected. The husband and wife both agreed to this procedure. On February 7, 1956, under cyclopropane, oxygen-ether anesthesia, the patient was subjected to a two-stage procedure. The first portion consisted of the removal of the vaginal septum to the vault of the vagina and a bilateral dilation and curettage. The second portion consisted of an abdominal laparotomy with a Strassmann unification operation and wedge resection of the left polycystic ovary. Because the uterine incision appeared to violate the integrity of the left tube at its entrance into the uterus, this was cannulated with polyethylene tubing, the distal end of which was passed out into the vagina. Figure 1 shows the two uteri with the left polycystic ovary as seen at laparotomy. Convalescence was uneventful, and the patient was discharged on her sixth postoperative day. The polyethylene catheter was removed six weeks postoperatively. A second salpingogram (figure 2) was made showing the single uterine cavity and bilateral patent tubes. The patient became pregnant seven months after operation and followed an uneventful prenatal course until the thirty-seventh week of gestation, at which time painless uterine bleeding began. The diagnosis of placenta previa was made, and an infant was successfully delivered by classical cesarean section. At operation, there was no evidence of a scar in the uterus, except

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Fig. 2. Single uterine cavity and bilateral patent tubes.

for an area of dimpling between the uterosacral ligaments. Because of the double cervix and the nonformation of any discernible isthmus uteri, the classical cesarean operation was elected. The patient was discharged on her fifth postoperative day following a normal con-

valescence. She has not become pregnant since, by choice.

SUMMARY

Anomalies of a woman's genital tract may occur. Many women have uneventful courses throughout pregnancy and delivery. There is a high incidence of abortion, premature labor, and postpartum hemorrhage in cases of bicornuate uterus. Awareness of this condition is the first step toward satisfactory diagnosis.

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CULTURE OF MENSTRUAL AND INTERMENSTRUAL SECRETIONS and endometrial biopsy should be used together after hysterosalpingography for the diagnosis of genital tuberculosis. Although the lesions are usually self-limited and frequently self-healing, pregnancies are successful only when the tuberculous process is arrested in the tubal stage.

The only means available at present for the detection of tubal tuberculosis is culture of the menstrual discharge. The disadvantage of this method is the delay in obtaining definite results. Since tuberculous lesions of the endometrium and salpinx contain few bacilli, generally only 1 of 3 or 4 cultures is positive.

The advantage of endometrial biopsy is speed. However, this procedure is less accurate than culture and is positive only when the endometrium is affected. In 103 patients with latent tuberculosis, culture of menstrual and intermenstrual cervical and vaginal discharges produced positive results in 89 per cent and biopsy in 63 per cent. In about 8 per cent of the cases in which cultures failed to show tuberculosis, biopsy of the endometrium was successful.

Genital tuberculosis usually improves with streptomycin therapy but may recur.

I. HALBRECHT, M.D., Hasharon Hospital, Petah Tiqva, Israel. *Am. J. Obst. & Gynec.* 75:899, 1958.

Suppression of Lactation with an Oral Androgen-Estrogen Preparation

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THE SEARCH for a satisfactory regimen for the suppression of lactation has preoccupied obstetricians for decades. The multiplicity of modalities currently in use testifies to the reality and scope of the problem.

Aside from the age-long use of binders, local ice packs, analgesics, cathartics, and fluid restriction, the hormonal approach to the suppression of lactation is the most widely favored today. Its rationale derives from the various theories of the hormonal effects responsible for the onset and continuance of lactation.

RATIONALE OF HORMONAL TREATMENT

It is known that the lactogenic hormone of the anterior pituitary gland, prolactin, is most directly involved in lactation.¹ The breast is believed to be made more susceptible to the influence of this hormone by the action of progesterone and estrogen, which are both produced by the placenta during pregnancy.^{2,3} Estrogen levels are high during pregnancy and fall sharply after the delivery of the placenta.² It is believed that progesterone exerts a prolactin inhibitory effect and that the growth stimulus of estrogen on the breast reduces susceptibility to the influence of prolactin.⁴ The fact is that the prolactin content of the anterior pituitary gland is high during pregnancy.⁵ However, evidence of prolactin in the circulation, namely, the formation of colostrum and milk, does not appear until after delivery. Selye and his group⁶ suggest that suckling of the breast by the newborn baby activates a neuroendocrine reflex mechanism which helps maintain an augmented secretion of prolactin.

Therefore, on the basis of these facts and theories, hormonal treatment can suppress lactation probably by either one of two separate endocrine effects: (1) secretion of prolactin may be

inhibited by suppression of anterior pituitary function or (2) susceptibility of the breast to prolactin can be eliminated.

EXPERIENCES WITH HORMONAL TREATMENT

Testosterone has been shown to suppress the pituitary gland and to effectively inhibit lactation in mice.⁷ The first report of successful suppression of lactation with this hormone in obstetric patients was published by Kurzrok and O'Connell.⁸ They found 50 to 150 mg. of testosterone propionate effective in 19 of 21 patients.

Doses of 25 mg. twice daily or 50 mg. once daily were found more effective than a single large dose of 150 mg. Administration in doses up to 300 mg. per month was considered the maximum amount compatible with safety and freedom from undesirable side effects.

Estrogen in various forms has also been used extensively to suppress lactation. Theoretically, it too inhibits the pituitary, and its growth stimulating effect inhibits the susceptibility of the breast to prolactin. However, estrogen must be administered for a long time — as long as thirty days for complete suppression of lactation. It is often ineffective if administered after lactation has become established. Nausea, vomiting, withdrawal bleeding, return of lactation, and engorgement often occur with estrogen therapy. These disadvantages were reported by Stewart and Pratt,⁹ Walsh and Stromme,¹⁰ and Morton and Miller.¹¹ We have also observed these side effects too often, for we used estrogen to suppress lactation for many years on our obstetrical service.

EXPERIENCES WITH COMBINED TREATMENT

Dissatisfaction with estrogens led us to introduce another method of treatment for the suppression of lactation. An oral preparation containing 5 mg. methyl testosterone and 0.25 mg. dienestrol per tablet, known as Estan, was introduced in our obstetric department in August 1955. This hormonal combination is said to have a synergistic action, making possible effective therapy

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TABLE 1
SUMMARY OF RESULTS

<i>Treatment</i>	<i>Number of patients</i>	<i>Withdrawal bleeding</i>	<i>Breast engorgement and pain</i>	<i>Satisfactory results</i>
Estan t.i.d.	537	15 patients (2.8%)	34 patients (6.3%)	488 patients (90.9%)
200 mg. androgen plus Estan t.i.d.	75	2 patients (1.6%)	4 patients (5.3%)	69 patients (93.1%)

with smaller, safer doses of each hormone.¹² Published reports are very favorable toward this preparation. Its routine use not only provides the desired result but also prevents engorgement and pain and does not cause withdrawal bleeding.

Rienzo¹³ reported good to excellent results in the postpartum suppression of lactation in 81.6 per cent of patients treated with this preparation. Edwards and Metoyer¹⁴ reported similar results in 83.3 per cent of patients. Garry¹⁵ also obtained good to excellent results in 83 of 100 postpartum patients treated with Estan. Laufc and McCarthy¹⁶ found results were exceptionally good in 95.5 per cent of patients who received Estan according to the following special dosage schedule that they devised. Treatment in all instances was started as soon as possible within the twenty-four-hour period after delivery. Each patient received 3 Estan tablets three times a day on the first and second postpartum days, 2 tablets three times a day on the third and fourth postpartum days, and 1 tablet three times a day on the fifth or last day.

METHOD AND RESULTS

Treatment for the suppression of lactation with Estan was started as soon as possible after delivery on our obstetric service. Two tablets of this androgen-estrogen preparation were administered three times a day for a minimum of five days but more often for six or seven days, that is, up to the time of the patient's discharge. These tablets are small, easy to administer, and well tolerated by patients. During two years of routine use in our hospital, Estan produced more satisfactory results than any other medication.

During the two-year interval between August 1955 and September 1957, a total of 721 patients were delivered on our obstetric service, and 612 of these were treated with Estan for the suppression of lactation. This androgen-estrogen preparation effectively suppressed lactation with virtual freedom from untoward side effects in 90.9 per cent of 537 patients who received no other supplementary hormonal medication.

At first, because of our inexperience with this form of treatment, 75 patients received an intramuscular injection of 200 mg. of long-acting androgen in addition to the tablets. However, observations in patients treated with the androgen-estrogen preparation alone soon showed that no significant advantage resulted from the androgen injections and, therefore, they were discontinued.

Fluid restriction was suggested but not rigidly enforced. Adjunctive measures consisted of the application of ice bags to the breast and the administration of mild analgesics in the few instances (6.3 per cent) in which pain and engorgement occurred. Generally, these complications were minimized with this medication. However, when they did occur, they were usually transitory and subsided within eighteen to twenty-four hours. In no patient did the duration and intensity of breast discomfort compare with that observed in patients treated with androgen alone.

In contrast to our previous experience with estrogen therapy, virtually complete absence of withdrawal bleeding was a most striking and gratifying advantage of combined hormonal therapy. The incidence of recurrent lactation after discharge was also "nil," although it had been a very frequent nuisance in the past when we used estrogen. Disturbances in postpartum menstruation did not appear in any of the patients treated with the androgen-estrogen preparation. Results of this therapy are summarized in table 1.

CONCLUSION

Routine lactation suppression with an androgen-estrogen tablet preparation has proved most satisfactory and superior to other methods of treatment that we have used for this purpose in the past.

Treatment with the androgen-estrogen is advocated because:

1. Suppression of lactation was successfully achieved with only very minimal breast engorgement and pain.

2. Withdrawal bleeding and disturbed postpartum menstruation did not occur.

3. The medication is small, easy to take, and well tolerated by patients.

Estan was supplied for use in this study by White Laboratories, Inc.

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DIFFICULT DELIVERIES caused by an oversized fetus usually become evident after the usual amount of fundal pressure or traction on the forceps fails.

Among 40,944 deliveries, 200 infants weighed over 10 lb. at birth. Of these, 60 per cent were males, and 40 per cent were females. White women are more apt to have oversized babies than Negroes. Increased maternal age, multiparity, and previous large infants are all of some significance. Diabetes mellitus and toxemia occur more frequently in mothers of large babies.

Presentation and length of labor are the same as with other infants. Forceps are used infrequently, which emphasizes the fact that delivery of the head is not difficult. Impacted shoulders are the most serious complication. The tight-ring maneuver described by Barnum is useful. After deep general anesthesia, the posterior arm is delivered first by flexing the fetal elbow and then sweeping the arm down over the anterior chest. At this point, the posterior shoulder is out, but the anterior shoulder is still impacted against the symphysis pubis. The infant is then rotated 180°, bringing the fetal back over the midline of the mother's abdomen to the side toward which the fetus originally faced. The shoulder which was out then comes into position just outside the symphysis, unlocking the obstruction.

The antenatal infant death rate is 7.7 times greater than normal. Placental insufficiency may be a factor. The intranatal infant death rate, which is 15.6 times higher than the usual rate, can be accounted for by difficult deliveries.

HARVEY A. GOLLIN, M.D., AVERON H. ELLIS, M.D., and EVAN F. EVANS, M.D., University of Illinois, Chicago. *Am. J. Obst. & Gynec.* 75:742, 1958.



Edward L. Tuohy, M.D.

By FRANK J. HIRSCHBOECK, M.D.

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IT IS A PRIVILEGE to be able to write of the life and career of an outstanding personality in our profession. As an admirer of his many talents, I have been chosen to review the accomplishments of this man. His voice today repeats his lifelong aspirations with the same ardor manifested in his service of fifty years as a student, organizer, and teacher and, above all, in his devotion to his profession and in the idealism for the advancement in the art and science of the practice of medicine.

In response to my letter requesting more intimate data of his life, Dr. Tuohy could not forego the opportunity to give first place to the creed of his professional pursuits: "Some of the more personal facts can well be less emphasized, but you will see that behind any progress that we may have made with our lives lies the deep desire to give Duluth and the area about it a medical atmosphere that is such that the other great dominant sections of Minnesota may not, on the whole, pass up Duluth as a lesser way-station. I cannot feel that this is a totally immodest aim when one considers what the Twin Cities, the University of Minnesota, and the great Mayo institution have grown into."

There could not be a more worthy ambition, and, despite years of work and effort in the face of the continuous struggle for better medical milieu in a well-qualified area, all his professional associates, intra- and extramural, express uniform approval of his unselfish devotion to the cause of medicine. No medical man is so highly regarded in the large area of his leadership, and the goals that have been reached attest to his influence.

A sense of humor, spoken of by Samuel Johnson as "closely akin to a sense of proportion," did not lead to self conceit—that would detract from his influence. His accomplishments have been centered

in the organization of greater teaching facilities and advancement in hospital operation and medical procedures rather than in personal medical practice. Therein lies much of his selflessness in striving for the greater good. His primary interest has been in the younger doctor and his progress. Unlike Mizner, who said, "Be good to the boys on the way up, because you will meet them on the way down," Dr. Tuohy strove to elevate them all to a level of parity.

THE EARLY YEARS

Dr. Tuohy's ancestors came from the counties of Mayo and Galway in northwestern Ireland, a part of the country truly Irish in its history and culture. The land was never deeply invaded by the seafaring Vikings, who preferred settling on the more accessible coasts of the eastern part of the country; by the Normans, in their conquest of the valleys of the southern streams; or by the few Spanish mariners, who were stranded on the coast of the Irish Sea and in the southern part of the country. The family names are distinctly Gaelic, and these more remote and secluded areas have adhered to their native tradition of freedom. They are a rather pure race and carry in their blood an intense patriotism and the attributes of independence, loyalty, humor, and a breadth of originality in their attitude toward all phases of life.

Dr. Tuohy's parents migrated to America in the later middle years of the last century, and, in 1861, the immediate forebears, Edward Tuohy and Margaret Towey—a strange similarity in names—were married in Winona, Minnesota, and became the parents of 8 children, of whom Dr. Tuohy and an older sister still survive. The family home was established on a farm in Chatfield, Minnesota, and it was there that Dr. Tuohy was born in 1878. The

early years in Chatfield schools were often interrupted by absences, necessitated by seasonal work on the farm, but his long struggle for an elementary and high school education ended in June 1898, after attending the latter for two years. The inherent talents of the young student were recognized by his high school teacher, who said, "Eddie, you must go to college, and I will help you finish high school in two years if you will study without interruption by working on the farm." With that inspiration, young Edward learned how to study and, he adds, "After that, the academic course at the University of Minnesota was no more than child's play." Three years later, in 1901, he entered the Medical School of the University of Minnesota. His zeal for improvement and study has never faltered and has proved a stimulus to others. His recital of the names of Charles Sigerfuss in biology and "Tommy" Lee in histology betokens his admiration of them as instructors. In his second year, he was appointed preceptor in histology. However, he told Dr. Lee that he was interested in clinical medicine and preferred to devote a closer allied interest to pathology, which was the root of medicine to him. This decision endeared him to Dr. Frank Westbrook, to whom Dr. Tuohy refers as the "molding agent" in his life. Of no one does he speak of as feelingly as an inspiration to his career. Dr. Westbrook later became the first president of the University of British Columbia, a position that Dr. Tuohy spoke of as the climax in the life of a great educator. In his later years as a medical student, Dr. Tuohy's interest in medicine was fostered by an association with Dr. George Head and Dr. Walter Sheldon as teachers.

On his graduation in 1905, he served for a short period as an intern in St. Joseph's Hospital, St. Paul. At that time, internships were not well organized, and, after a lapse of a few months, he was offered a position at St. Mary's Hospital in Duluth as intern, head of the clinical laboratory, and pathologist, a position which he accepted at the munificent salary of \$33 a month plus "keep and found!"

In his new position, he conducted all the intramural activities and soon served also as a "gadfly" to professional indifference (early evidence of his activities in the years to follow). In his work in the pathologic and clinical laboratory, he checked clinical diagnoses, and he treasures the memory of certain early achievements, such as finding a hypernephroma in a nephrotomy performed for what was thought to be tuberculosis. Dr. Tuohy's more accurate histologic diagnoses were accepted by the leading surgeons at the hospital sometimes with approval and appreciation and, at other times, with disapproval and disgust. Nevertheless, the results were greater accuracy in diagnostic methods and improvement in hospital technic. Dr. Tuohy's close friendship with Dr. Braden, a surgeon at the hospital, later led to his acquaintance and, finally, his association with Dr. W. A. Coventry, an affiliation which persisted until Dr. Coventry's death a few years ago. As director of the laboratory, a close

friendship arose with Bishop James McColrick, who was diocesan director of the hospital and who encouraged the Sisters of the Benedictine Order to comply with Dr. Tuohy's request for the formation of a good laboratory. This move led step by step to innovations which added notably to the efficiency of the institution and redounded to the credit of the administrators of the hospital.

In 1907, Dr. H. M. Bracken, chief of the Minnesota Department of Health, urged Dr. Tuohy to move to Duluth to serve as director of a branch office of the State Board of Health. This position offered him an opportunity to begin the private practice of internal medicine, which he combined with excursions into general practice and even an occasional obstetric case. At this time, the first cystoscopic examinations were being made, and a patient on whom the first attempt at cystoscopy was made by Dr. Tuohy spoke to me in later years of his discomfiture at the procedure and some doubt as to its value as a diagnostic measure!

In the same year of 1907, he married Ida M. Boyce, who had been a student with him in the academic school at the University of Minnesota. Their only son, Edward, who followed his father in the choice of medicine as a profession, was born, fittingly, on Saint Patrick's Day, March 17, 1908, and is presently an outstanding anesthesiologist in Los Angeles. A few years later, in November 1911, his only daughter Catherine was born.

It was in this period that Dr. Tuohy first evinced an interest in the more adequate control and treatment of tuberculosis. At that time, tuberculosis and pneumonia were the most common causes of death, and the vastness of the tuberculosis problem was felt throughout the world. In 1908, he attended the International Congress on Tuberculosis in Washington, D.C., where the leading phthisiologists of the world were gathered. Robert Koch was in attendance and had not yet altered his opinion that tuberculosis could be successfully treated with tuberculin. However, Newsholme of Great Britain inspired a deep interest in Dr. Tuohy with his views concerning the possibilities of controlling the disease by segregation, thereby limiting its spread by avoiding close contact with infected persons. Upon his return to Duluth, Dr. Tuohy enlisted the aid of the citizens in the community to accept the sanatorium method as the principle way to control the disease. Legislation was drafted for the founding of the first county institution in Minnesota for the care of the tuberculous patient, which would aid in the work already begun in the state tuberculosis sanatorium at Walker, Minnesota. Organization for building the hospital and its management were fostered by Dr. Tuohy, and his interest persisted as a member and president of the sanatorium board of St. Louis County for twenty-eight years. He was fortunate in obtaining men of unusual capacity and ability for superintendents of the hospital. Doctor "Billy" Hart, a native Canadian, was the first superintendent, and, when he left Nopeming to accept

another post, the commission of the sanatorium had the good fortune in obtaining Dr. Arthur Laird as his successor. During this period, great strides were made in the control of the disease and in the prevention of new infections. Under the superintendency of Dr. G. A. Hedberg, who succeeded Dr. Laird upon his retirement, the surgical treatment of the disease came into recognized prominence and was undertaken at the sanatorium. After Dr. Hedberg's death a few years ago, Dr. R. W. Backus was installed as superintendent, and, during the administrations of these men, the medical treatment of tuberculosis came to fruition. In 1909, the death rate in St. Louis County was 130 per 100,000 of population, whereas, presently, it has been reduced to the rate of 4 per 100,000—an achievement almost unequaled in the history of medicine and a lasting tribute to the foresight of the early pioneers. This period also marks the passing of an era in practice in which clinical medicine was a dominating feature. The changes were the result of the tremendous advances in health control, the use of the diagnostic x-ray, improved laboratory studies, advances in chest surgery, and, in the past few years, the addition of medicinal aids that have revolutionized the treatment of the "white plague" of fifty years ago.

Due to increased duties and other plans for his future, Dr. Tuohy prevailed upon Dr. Thomas R. Martin, a staunch and dear friend with unusually admirable and zealous capacities, to come to Duluth and take charge of the Duluth branch of the State Board of Health. This marked a "turning point" in Dr. Tuohy's career, liberating him for future progress and, at the same time, establishing a worthy successor to his post as well as effecting a close personal and professional association that redounded to the benefit of both these pioneers in health problems. An effort was made to establish better medical care for the poor in the area immediately contiguous to Duluth. A method was devised whereby the younger physicians of Duluth could serve under the county physician, Dr. Robert Graham, insuring better care for the poor and an opportunity for them to supply necessary medical care without cost to the county and, at the same time, offering opportunities for study and advancement in their practice. Meeting opposition from many of his fellow practitioners, Dr. Tuohy decided to go to Europe in 1912 to study internal medicine, leaving the work of the State Board of Health in the able hands of Dr. Martin.

THE YEAR IN VIENNA

After the early years of work in the hospital and State Board of Health laboratories, the struggle to control rampant tuberculosis, and the organization of adequate facilities for the control and treatment of tuberculosis at Nopeming in addition to the labor of beginning private practice, the year of 1912 in Vienna was a great adventure. Vienna at that period was the hub of systematized medical study in all its branches. Under the aegis of the American Medical

Association, courses were well organized, and a center for registration and graduate curricula was offered to foreign students. The arrangements were excellent, and the association at that time with the leading teachers of Austrian medicine was immensely and justly famous. The facilities of the Allgemeines Krankenhaus in Vienna offered opportunity for study in clinical medicine not recognized before. To appreciate this, one need only recall the work of Erdheim in pathology; Stoerck in gastroenterology; Neumann in tuberculosis; Holzknecht and Haudek in radiology; Kovacz, Epperling, Wenckebach, and Von Jaksch in medicine; Fuchs in ophthalmology; Billroth in surgery; and Lorenz in orthopedics. I read Dr. Tuohy's notes written while taking the courses in Vienna, and one can glean his delight in the opportunity for study in his chosen field of internal medicine and also for a fine background in pathology. His devotion to the work of Neumann and, particularly, Erdheim was a constant expression in his notes. One can imagine his joy when reading of Erdheim's analytic approach to his exact pathologic observations, especially in the parathyroid gland, and the clever clinical deductions of myocardial infarctions. One is impressed by the similarity of the clinical and pathologic approaches to the disease.

THE RETURN TO PRACTICE

On returning from Vienna, it was again a matter of engaging in practice, and because of his preference and Vienna training, Dr. Tuohy naturally chose internal medicine. His Duluth associates had the same leaning as he for group organization, and, after a period of trial and error and defeats and successes, these specialists organized the Duluth Clinic in 1916. Dr. W. A. Coventry had studied in Vienna and Dublin; Dr. O. W. Rowe, the first pediatrician in Duluth, had studied in Vienna and Berlin; Dr. J. A. Winter took graduate work in the Viennese clinics, in diseases of the eye, ear, nose and throat; Dr. T. L. Chapman, a surgeon, had visited the clinics of London; Dr. N. L. Linneman had adopted in his foreign studies the association of skin and genitourinary diseases, which is now considered unreasonable; Dr. J. R. Kuth had worked in orthopedics under Lorenz in Vienna; Dr. W. McCabe had specialized in roentgenology; Dr. C. Conkey's specialty was in diseases of the eye, ear, nose and throat; Dr. A. Collins had trained at the Mayo Clinic. These men formed the Duluth Clinic, which now has a staff of 40 physicians. Organization of the clinic was not easy at first. However, the different, forceful personalities were gradually welded into an efficient coterie of men imbued with the zeal to practice good medicine. When new members were added, it was soon apparent that the carrying force was well expressed in an early preamble, "that the organization is founded for the purpose of extending to the community a good type of practice, combined with the desire for study and improvement in the practice of individual constitu-

ents." For years, the elements of improvement were fostered by an almost absolute insistence upon attendance at all scientific meetings and weekly staff conferences, rigid periods of vacation, regular hours of practice, and participation in available programs. In all these activities, the examples of the elder physicians were always present, and none had greater foresight than Dr. Tuohy. However, some men, as in any clinic, left to follow independent practice. Some were not urged to continue, as differences in personalities arose, but new and enthusiastic physicians were sought to fill the vacant spots, and the early leaven continued to grow. Younger men were urged to join the clinic and, after a short period of general practice in the clinic, were asked to work under the tutelage of the older men until their abilities had been amalgamated in the common venture. Fortunately, these additions consisted of men with great intelligence and ambition, who ultimately proved to be excellent members. Later, as the methods of training men in specialties were changed, younger men were engaged to serve in the different fields, which added to the clinic the material advantages of newer developments in the ancillary sciences gained from the excellent teaching in the various universities and clinics throughout the country. I believe that one of the strongest attributes of successful clinics has been the organization of men starting with equal opportunities and developing their fields simultaneously, each ready to make sacrifices for the ultimate goal. Dr. Tuohy and his associates felt that clinics can develop best and function more smoothly if all departments grow apace rather than if attention is focused upon one individual. The martinet who aims to lead and direct in all matters is not conducive to sound and happy growth, and successful clinics usually emerge from talents that can work in unity.

About 1920, the American Hospital Association was organized and strove to accomplish greater improvement in hospital practice, just as better educational methods in the medical colleges of America had been fostered by the organization of the American Association of Medical Colleges about ten years earlier. In 1920, the hospitals in Duluth promoted better scientific and ethical practices among their staffs. Anyone acquainted with the haphazard hospital records before that time can appreciate the results obtained through proper staff organization and the maintenance of better records. Adequate histories and progress notes and better and more uniform laboratory and therapeutic standards were initiated. The records were reviewed each month at the staff meetings. As a result of the reorganization, the hospital was able to offer better opportunities for internships, providing the younger men with a proficiency which, today, is one of the great rewards of these efforts.

In 1921, Dr. Tuohy organized weekly clinical pathological conferences at St. Mary's Hospital and encouraged physicians to procure permissions for autopsies, thereby profoundly effecting the growth of

more accurate scientific practice. For several years, the Duluth hospitals were among the first 10 in the United States in the percentage of autopsies performed. In these measures, Dr. Tuohy, with the aid of Dr. Berdez, a pathologist from Switzerland, played the leading role. The attendance at the clinical conferences was excellent and participation unique in its extent. From the first, Dr. Tuohy's attempts were stimulated by a nonpartisan review of all cases, naming the doctors and even, at times, patients in order to promote an intimate discussion, which always proved a stimulant to better work.

The work in pathology and clinical medicine was not his only aim, but full-time roentgenologists, pathologists, and laboratory supervisors were appointed. Newer x-ray equipment, electrocardiographs, laboratory techniques, medical photography, and other ancillary developments promoted the well-equipped hospitals of today. These advances could not have been brought about without the constant aid of Sister Patricia, the superintendent of St. Mary's Hospital, who worked unstintingly to provide all the help asked for from the Benedictine nuns who operated the hospital.

The cooperation of other doctors from outside Duluth was most gratifying and portrays the great generosity of many medical friends. Dr. William O'Brien, of the pathological department of the University of Minnesota, was a constant help in the early days of organization by presenting two lecture courses extending over several weeks in successive years. Dr. Leo Rigler offered similar courses in roentgenology, teaching the newer developments in clinical and diagnostic x-ray study. These lectures were promoted for the sake of all practitioners in Duluth, and their faithful attendance proved their popularity and value. The interest shown by physicians from the University and Dr. Tuohy's friends in the Twin Cities—friends like Drs. Henry Ulrich, S. Marx White, Tom Peppard, and Charles Hensel—was helpful directly or indirectly. Friendship and stimulating interest from the Mayo Clinic served to amalgamate a personal camaraderie in the larger cities of the state. On one occasion, when Dr. Rowe, the dean of the local pediatricians, was ill with pneumonia, Dr. Tuohy called the Mayo Clinic concerning the then highly extolled oxygen tent. Immediately, an apparatus was sent to Duluth, and Dr. Binger of Rochester offered to oversee its installation and operation. One of my patients, an electrical engineer, who was a patient in the hospital at the time, wanted to see this new mechanism at work, and, after he examined it, he said, "If I had invented that apparatus I wouldn't want anyone to know it!"

GROWTH OF SPECIAL SOCIETIES AND OTHER DEVELOPMENTS

The University of Minnesota was growing rapidly in the 1920's in influence and in its excellent faculty. Dr. Tuohy, Louis Wilson of Rochester, and Dr. Theodore Bratrud of Warren, Minnesota, were ap-

pointed to an alumni advisory committee and served at the time the Mayo Clinic was incorporated into the University faculty. The affiliation at first was more or less acrimonious but finally evolved into a very successful union of forces, tending to unify the University's more academic work and its research with the experiences of a great clinic.

In the first World War, Dr. Tuohy served as a heart board examiner at Camp Douglas, working for a time with Dr. Dan Glomseth of Des Moines, a conspicuous worker in cardiac physiology. This work was in conformity with Dr. Tuohy's love for clinical cardiology and provoked a continuous interest in that specialty.

The American College of Internal Medicine was organized shortly thereafter, and Dr. Tuohy was a charter member, serving for sixteen years as governor for Minnesota on the National Board of Governors for the society.

In Minnesota, he was one of the founders of the Minnesota Society of Internal Medicine and the Minnesota Society for the Study of Diseases of the Heart and Circulation and was a persistent and vocal proponent of their aims and an active participant in their programs. Dr. Tuohy has also received many distinctions, a very notable one from his alma mater, the University of Minnesota, which bestowed upon him the distinguished service medal for his outstanding work for the University and his success as a prominent graduate. He was elected president of the St. Louis County Medical Society and, later, was elected president of the Minnesota State Medical Association.

In his civic pursuits, he was elected governor of the ninth district of Rotary International and, with his son, journeyed to Vienna where he was a delegate to the international convention. Although happy to return to his former scene of study, he sadly noted the decline of that which had been to him an outstanding period in medical study. After leaving Duluth in 1956, he became a postservice member of Rotary in an enjoyable confraternity of former members in his new home in Santa Barbara.

Travel has always been a minor obsession with Dr. Tuohy, not merely for the entertainment offered but also for the opportunity to satisfy his interest in other cultures. An equally eager traveler, Mrs. Tuohy always accompanied him. His experiences as a cosmopolite fostered a deep love for art, music, history and politics, and his discerning mind brings forth delightful entertainment when he tells of these interests. His pleasure in travel was illuminated by the friendships he cultivated in his journeys to Europe and Mexico and his extensive travels in our

own country. His pervading sense of humor enabled him to classify his experiences in their proper value. On one occasion, after he had been in Mexico City for two weeks, he was asked what he thought of the Mexican political situation. He answered that he was hardly in a position to judge a political situation in so short a time, since the natives of Mexico seemed to be confused themselves in regard to their political picture! On one occasion, while traveling in Jamaica, a prowler stole his trousers by lifting them through the transom in the room of his hotel. Upon his return, he said that evidently some people of his acquaintance seemed more interested in the fate of his trousers than in the opportunity for intellectual growth that he might have indulged in! His humor, so constantly a part of him, always was an asset in public and professional appearances, and his discussions were anticipated with enjoyment. His sallies of wit were not always one-sided, and, when they were in defense of himself, he was always gracious. On one occasion, the name of Ohara arose as one of the discoverers of tularemia, and he burst forth with a eulogy of the Irish in the forefront of medicine. When told that Ohara happened to be a Japanese, a "slow burn" came over him, followed at once by a gleeful acceptance of the correction! He was always a severe critic in medical forensics. However, as his many medical friends can well remember, his criticism was always pointed and logical but also with an acknowledgement of similar propensities in others. It was in this way that he conducted his clinical pathological conferences, always rendering them sprightly and never dull. Visitors were frequent from other centers, and their participation was always sedulously encouraged and opportunity was given for the presentation of a speaker's "tour de force."

The death of Mrs. Tuohy was a grievous shock. Dr. Tuohy had witnessed the suffering she endured for many months with a postherpetic neuralgia, which undoubtedly aggravated a previous hypertension. He went through a period of bereft loneliness which was hard to endure and sad to witness. A few years later, he and Mrs. Alice Lyons Tweed were married, and their similar love for travel and experience as well as compatibility of other interests have developed into a companionship which is a joy for their friends to witness. They are now living in Santa Barbara, California. Dr. Tuohy's ardor for visiting hospitals, clinics, and medical meetings still persists, and, on his return to the clinic which he helped to form, there is always an occasion for a recital of his experiences and observations in medicine, travel, and contact with other people.

Nursing Home Care

WITHIN THE PAST FEW MONTHS, there has been formed The Joint Council to Improve the Health Care of the Aged by the American Medical Association, the American Hospital Association, and the American Nursing Home Association. This Council has as its primary objective the improvement of care of the aged and chronically ill. In any consideration of such care, the need for high quality nursing homes becomes very evident. Prior to the formation of this Council, a number of meetings between representatives of the ANHA and the AMA had taken place. There were also meetings between representatives of the AHA and the ANHA to which AMA was invited and attended. The AMA has been represented by various members of the committees of the Council on Medical Service. These so-called liaison meetings were extremely productive and informative in that it was apparent that the three groups had basically the same objective — to improve the quality of care in nursing homes. In February 1958, the United States Public Health Service sponsored a National Conference on Nursing Homes and Homes for the Aged in Washington. Following this, the American Hospital Association held a similar conference in Chicago in May. The AMA had active representation at both conferences.

There are presently in existence approximately 25,000 nursing homes with approximately 450,000 beds. Of course these homes range from the very good to the very bad and give a wide range of services. In most states, they are subject to license usually by the State Health Department and, in a few states, through the Department of Public Welfare. It is the avowed purpose of the ANHA to make every effort to improve the physical facilities and the care in them. They feel, and rightly, that they must have a lot of assistance from not only the organized medical profession but also from individual doctors to achieve this objective.

At the present time, there are two definite programs being developed. The first program is being done by the ANHA and consists of a pilot classification study of all the homes in the state of Illinois. The ultimate purpose would be to acquire sufficient information which might eventually lead to a system of accreditation comparable to that used for the hospitals. It has been felt that there is lacking a definite standard for medical care and medical

supervision of nursing homes so that a set of "guides" is being developed primarily by the representatives of the Council on Medical Service. The guides currently being proposed will be rather broad in scope and will suggest that (1) each patient should have the care of an individual physician and (2) each nursing home should have some doctor who is primarily responsible for the general care in the home. In the case of a large home, there might be a staff organization similar to that of a general hospital, whereas a smaller home might well be served by a single physician.

In the course of discussions on this subject, it became readily apparent that some doctors did not evidence sufficient interest in the over-all improvement of care in a nursing home. We believe that, in any area where there is a nursing home or homes, it would be in the best interests of the doctors, the patients, and the home operators if physicians would take an active interest and exert leadership in improving the quality of not only medical but of general care.

At the National Conference on Nursing Homes and Homes for the Aged, it was suggested that facilities be classified as follows:

- A. Residential facilities
- B. Personal care facilities
- C. Nursing care facilities
- D. Comprehensive services facilities

The report goes on to define the type of services which would be rendered in each type of facility.

Perhaps the greatest difficulty encountered by those who wish to operate high-grade nursing homes has been in the field of finance. It has been difficult to secure financing for construction of modern buildings, and of course there is the difficulty of financing the operation of the home. Most nursing homes are proprietary and hence not eligible for Hill-Burton funds. Following discussions between the various groups, the AMA has approved the principal of long-term, low-interest loans for the building of nursing home facilities guaranteed by the federal government. This has been designated as an FHA type of program. Testimony has been entered in two congressional hearings by representatives of the AMA approving this type of loan. Providing sufficient current income to operate the home satisfactorily involves consideration of the entire problem of proper

support of the nonworking population. It is estimated that approximately 35 per cent of older persons have sufficient means of their own to care for themselves in a satisfactory manner. However, increasing numbers of persons are dependent on various forms of governmental assistance. Frequently, it is in this area that operators of homes find themselves held down to such a low income that they are unable to provide the best type of services. Welfare boards involved in public assistance programs are required to keep their payments for these services as low as possible, and in many instances they are below actual cost. At the present time, there does not seem to be any remedy for the rigidity of government programs. The possibility of providing some type of insurance for this care is being explored, but it can readily be understood that great difficulties would be encountered in working out a suitable in-

surance plan. Naturally it would be best if each individual or his family were able to provide sufficient funds for their care in old age and times of sickness. Such a situation does not seem to be developing currently.

Our national organizations are all vitally interested in and actively concerned with the problems involved in providing a better quality of care for the aged and chronically ill. It is to be hoped that every doctor will take an active interest in this program and contribute both his time and medical knowledge wherever it will do the most good.

WILLARD A. WRIGHT, M.D.

*Chairman, Committee on Medical and Related Facilities,
Council on Medical Service,
American Medical Association,
Williston, North Dakota*

Gynecologic and Obstetric Pathology, by EMIL NOVAK, M.D., and EDMUND NOVAK, M.D., ed. 4, 1957. Philadelphia: W. B. Saunders Co. \$14.00.

This textbook, which has become a standard for students of obstetrics and gynecology, has come out in a new edition since the passing of the senior author.

In this edition, recent literature has been drawn on liberally. References extend through 1956. There is new material on cervical mucous changes in menstruation cycles and during pregnancy as well as on exfoliative cytopathology.

Color is used quite effectively in some parts of the book. Other illustrations are well done, and the printing is excellent. The text lends itself to easy reading, and no library is complete without this excellent book.

REUBEN F. ERICKSON, M.D.

Roentgenology of the Chest, edited by COLEMAN B. RABIN, M.D. Editorial committee: BENJAMIN M. GASUL, M.D., BURGESS L. GORDON, M.D., J. WINTHROP PEABODY, SR., M.D., LEO G. RIGLER, M.D., ISRAEL STEINBERG, M.D., and HAROLD G. TRIMBLE, M.D., 1958. Springfield, Illinois: Charles C Thomas, 484 pages. \$19.50.

The stated purpose of this book is "to present roentgenology of the chest to the roentgenologist from the clinical standpoint, and to the



clinician from the radiological point of view." To fulfill this pledge, a galaxy of 50 authors, both radiologists and chest physicians, have been recruited and have contributed chapters on subjects of special interest to them. One of the pleasant consequences of the stature of the contributors is that the text is alive with positive opinions. Parenthetically, it should be noted that the book is further enlivened when the diverse opinion is presented with the same degree of positivity.

Approximately 300 pages are devoted to the lungs; 50 pages to the pleurae, diaphragm, and mediastinum; and 100 pages to the heart. As would be expected from this distribution, the pulmonary subjects are dealt with in the most detail. The chapter divisions in the pulmonary section are of interest. While the first chapters confine themselves to descriptions of such diseases as tuberculosis, fungous infections, and so forth, the latter part of the book covers such subjects as special signs in chest roentgenology, isolated nod-

ular shadows, and linear shadows. This dual system of chapter division results in an emphasis on the clinical viewpoint in the first portion of the book and an emphasis on the radiologic point of view in the latter.

Chapters on the normal findings in the chest are brief but well-illustrated. The over-all quality of the illustrations is excellent as are the explanatory notes which accompany them.

This book will interest all physicians who wish authoritative but nonencyclopedic information to supplement their knowledge of chest diseases.

JOHN R. AMBERG, M.D.

Lens Materials in the Prevention of Eye Injuries, by ARTHUR H. KEENEY, M.D., 1957. Springfield, Illinois: Charles C Thomas, 73 pages. \$3.50.

The purpose of this monograph is stated by the author in Chapter 1 as follows: "(1) to analyze the technical development of safety lens materials useful in spectacles and goggles to prevent mechanical injury, (2) to study experimentally the characteristics of safety lens materials, and (3) to formulate specific indications and contraindications for the various materials."

The 7 chapters of the book are: I. Introduction and Purposes, II. Early Steps in Technical Development of Protective Lens Material

(Continued on page 32A)

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BOOK REVIEWS

(Continued from page 500)

and the Concept of Preventing Eye Injuries, III. The Development of Current Safety Lens Materials, IV. Experimental Studies with Protective Lenses, V. Relative Merits of Plastic Lenses, VI. Indications of Contraindications of Various Lens Materials, and VII. Summary and Conclusions.

In this monograph, Dr. Keeney presents the history of protective spectacles, largely for industrial purposes. The second chapter gives a very interesting discourse on the development of safety glass. It is difficult for us at this time to imagine people not being safety glass conscious. However, this development was slow in coming. Much work has been done to develop the safety spectacle concept. At the same time, materials for frames, lenses, and so forth had to be invented or developed, which would allow the workman to see and, at the same time, protect him.

Although this monograph may appear on the surface to be rather technical, it is really very interesting reading. The good and bad points of the various types of safety glass are discussed as well as where and

why different types of safety spectacles should be used.

The book is printed on smooth paper and is fairly large and readable. The excellent illustrations are all black and white.

This small monograph fills an unusual place in the library of the practicing ophthalmologist as well as the manufacturers and dispensers of safety eye wear. It gathers together and sums up a great deal of material which is not, to these reviewers' knowledge, readily available. The ophthalmologist or the ophthalmic dispenser will be able to make proper recommendations at a glance to any industrial concern wishing to introduce an eye safety program. These reviewers feel that this monograph is a very worthwhile contribution to the current body of ophthalmic literature.

FRANCIS M. WALSH, M.D.
LEON D. GARRIS, M.D.

•
Pica, by MARCIA COOPER, Sc.D.,
1957. Springfield, Illinois: Charles
C Thomas, 114 pages. \$3.75.

This is a very extensive survey of every aspect of the little known but fascinating subject of pica done in a carefully organized fashion. A his-

toric survey of pica as recorded in the earliest literature from ancient and medieval times down through the present is presented in a detailed, interesting account. A study of pica in domestic animals is included.

Laboratory experiments of self-regulatory functions in animals and young children are cited as a possible analogous situation in which pica is practiced to satisfy intrinsic physiologic needs. A complete chemical analysis of edible earth and its possible contribution to human and animal nutrition is made.

The study on pica of 784 preschool children was undertaken by the author. The incidence of pica, its distribution by sex and race, its various forms, and its relationship to various factors, such as intelligence and the socioeconomic status of the family, were determined. There is considerable speculation concerning the various possible factors, but no definite conclusions are made from this study.

The book serves to bring the subject of pica to the attention of practicing physicians, particularly the pediatrician and obstetrician.

RUTH HASE, M.D.

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Vaccinia Virus Immunization of Patients with Recurrent Herpes Simplex Virus Infections

T. E. EYRES, M.D., and E. C. PIRTLE, Ph.D.

Vermillion, South Dakota

IT IS A FAIRLY WELL-ACCEPTED FACT that most primary infections with the virus of herpes simplex occur in early childhood and at a time when no homologous neutralizing antibodies are present. The majority of initial encounters with this virus go unnoticed, but a number of young susceptible children experience a very pronounced herpetic stomatitis accompanied by systemic reactions.¹ Following either of these two extremes in response to the initial experience with the virus of herpes simplex, neutralizing antibodies can be detected in the blood. Although fluctuations in antibody levels may be detected in herpetic sera from time to time, the neutralizing capacity is probably maintained for life.^{2,3}

The virus of herpes simplex is a relatively successful parasite. It finds new and frequent hosts among human beings, the majority in the form of subclinical infections. Except in the less common involvements, such as eczema herpeticum and herpes encephalitis, tissue damage to the host is minimal. Although neutralizing antibodies are present after the first natural experience with this virus, such immunity is ineffectual in combating the recurrence of lesions in herpetic patients. Thus, it appears that the herpes virus is well adapted for survival in its human hosts.

Even though a relatively large percentage of individuals actively acquire and maintain anti-herpes immunity early in life, a certain number experience numerous recurrent attacks by this viral agent. When the initial lesions occur in the buccal mucosa, subsequent lesions generally develop around the mouth or face.¹ In women, if the primary area of involvement occurs on the genitalia rather than the buccal mucosa, the lesions are usually observed on the labia pudendi and vaginal mucosa, with recurrences most often on the former. Occasionally, the primary herpetic lesion occurs on the cornea, commonly resulting in a dendritic keratitis. Recurrent lesions upon the cornea often result in cumulative impairment of vision.⁴ Symptoms in secondary herpes attacks are most frequently restricted to the site of lesion activity, and systemic effects are minimal or absent.

In considering recurrent attacks by the virus of herpes simplex, two points should be emphasized. First, recurrent lesions tend to appear in close proximity to the area of primary involvement. This suggests that the pathogenesis of the primary lesion induces some critical alteration in certain host cells, for example, hypersensitization. Second, because neutralizing antibodies are present prior to the appearance of recurrent lesions, it appears logical to conclude that endogenous (latent) virus rather than exogenous is responsible for the recurrent episodes. In support of this conclusion, one need only refer to some of the recent evidence and reports⁵ on

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the potentialities of noninfectious stages of immature virus (provirus) present in host tissue and how these may be stimulated to undergo complete cycles of viral replication to yield mature infective virus.

Renewed activity of latent herpes virus may be stimulated in different patients by a number of factors, such as direct trauma, sunburn, febrile illnesses, menstruation, and emotional stress. With the exception of direct trauma, it would appear that increased metabolic processes which accompany the other factors could "trigger" the herpes virus into increased activity. Whether there is a common basis for these factors, for example, moderate to pronounced elevation of body temperature, the end result in the chronic herpetic patient is the same, that is, periodic appearances of new lesions. Three possibilities have been considered as sites for herpes virus to remain dormant between periods of clinical activity:⁶ (1) in epithelium of the affected area, (2) in terminal nerve endings in the affected sites, and (3) in ganglia associated with fibers leading to terminal nerve endings.

Although immunization of herpetic patients with vaccinia virus has been carried out by others,⁷⁻⁹ it was desired to evaluate this method of therapy in a cross section of patients, using high-potency vaccine, and to follow their clinical progress over a period of time. It was hoped that some conclusion could be reached concerning whether vaccinia virus does exert a blocking effect upon the virus of herpes simplex.

MATERIALS AND METHODS

Patients. The distribution of men and women among the 30 subjects in this investigation was about equal. Ages ranged from 13 to 61 years. On the basis of the case history, the frequency and degree of recurrent herpes were graded as mild, moderately severe, or severe. The lesions were distributed primarily about the mouth and face and involved from 1 to 10 cm. of surface area.

Isolation of virus. The clinical diagnosis of recurrent herpes simplex was confirmed by isolating the etiologic virus in embryonated eggs from the vesicular fluids from all but 5 of the patients studied. The isolated viruses were identified by virus neutralization in embryonated eggs with known antiserum prepared in immunized rabbits.

Vaccinia virus for immunization. The vaccine virus was the standard calf-lymph virus used in the routine immunization against smallpox. The vaccine was delivered packed in dry ice and was kept at -20°C . until needed.

Procedure of immunization. If a patient gave no definite evidence of having been immunized against smallpox, an initial immunization was given and the primary response allowed to regress for three weeks to one month before additional immunizations were given. A series of 7 immunizations was then performed at weekly intervals. No untoward reactions were observed in any of the patients undergoing multiple immunization with vaccinia virus. However, herpes zoster did develop in 1 patient after receiving the third of 3 additional immunizations. In no instance was a patient told that the vaccinia immunizations would stop the recurrent attacks of herpes. On the other hand, patients were told that an honest appraisal of the method was being attempted and that they might not experience improvement after receiving the immunizations.

Follow-up contacts. To determine the status of recurrent attacks since completion of the vaccinia immunizations, local patients were contacted either in person or by phone, and the others were contacted by mail.

RESULTS

In our follow-up contacts, essentially all of the 30 patients with recurrent herpes simplex experienced relatively good improvement following multiple vaccinia immunizations.

Table 1 presents a summary of information and results of this investigation. Two of the 30 patients experienced no further recurrences. 17 experienced marked improvement, 10 showed improvement, and 1 did not reply. Those indicated as showing *marked improvement* experienced only a rare recurrence after their immunizations, and these were very mild and involved much less surface area. Furthermore, the lesions in these infrequent recurrences were definitely of an abortive nature, seldom persisting for longer than twenty-four to thirty-six hours. Those patients indicated as showing *improvement* likewise experienced a longer interval between recurrences. Their lesions were definitely less severe and the transition more rapid than before vaccinia immunizations. Two patients, cases 16 and 27, received 3 and 5 additional vaccinia immunizations, respectively.

DISCUSSION

Bedson and Bland¹⁰ found no immunologic crossing between the viruses of herpes simplex and vaccinia in their experiments on guinea pigs. If there is no cross-immunizing ability between these two viruses, wherein is an answer sought to why many recurrent herpetic patients experi-

TABLE 1
VACCINIA IMMUNIZATION IN THE TREATMENT OF RECURRENT HERPES SIMPLEX

Patient	Age	Recurrence of herpes	Post-treatment observation (months)	Status at final observation
1	27	Severe	72	No further lesions
2	24	Severe	39	No reply
3	21	Severe	38	Improved
4	20	Moderately severe	38	Marked improvement
5	28	Moderately severe	37	Marked improvement
6	20	Moderately severe	37	Improved
7	27	Moderately severe	36	Improved
8	18	Moderately severe	31	Marked improvement
9	43	Moderately severe	29	Marked improvement
10	22	Moderately severe	29	Marked improvement
11	30	Severe	27	Marked improvement
12	23	Moderately severe	26	Marked improvement
13	13	Moderately severe	26	Improved
14	50	Moderately severe	25	No further lesions
15	20	Moderately severe	25	Improved
16	45	Moderately severe	23	Marked improvement
17	26	Moderately severe	22	Marked improvement
18	22	Mild	22	Improved
19	20	Severe	21	Marked improvement
20	22	Severe	21	Marked improvement
21	23	Moderately severe	20	Improved
22	19	Moderately severe	19	Marked improvement
23	27	Moderately severe	18	Marked improvement
24	23	Moderately severe	18	Marked improvement
25	24	Moderately severe	14	Improved
26	20	Moderately severe	14	Marked improvement
27	61	Severe	12	Marked improvement
28	20	Severe	10	Marked improvement
29	20	Mild	8	Marked improvement
30	19	Moderately severe	6	Improved

ence improvement after multiple immunizations with vaccinia virus?

Blank and Brody¹¹ reported that they achieved beneficial results in patients with recurrent attacks of herpes simplex by using psychotherapy, and they obtained variable results with multiple vaccinia immunizations. Their patients were suffering from emotional instabilities, which, at the same time, probably made them physiologically unstable. We are of the opinion that physiologic imbalance, with concomitant metabolic alterations, may serve as an inciting agent in recurrent herpes, *vide infra*. However, we are not in agreement with "... , other than removing or modifying excitants, all forms of therapy owe

their effectiveness to their psychological suggestive effect upon the patient,"¹²

In an article by Roxburgh,¹³ an excerpt from a letter by Edward Jenner, dated October 25, 1804, and taken from *Baron's Life of Jenner* reads: "The further I go on with vaccination, the more I am convinced that the great and grand impediment to the correct action of the virus on the constitution is the coexistence of herpes" In still another article regarding some older observations, Findlay¹⁴ refers to Montaigne, who, in 1580, stated that "one ill cureth another;" to Quier, who, in 1780, reported that smallpox was invariably a mild disease in children with secondary yaws; to Winterbottom,

who, in 1803, reported that some African tribes of the Sierra Leone region treated chronic ringworm by inoculating the affected area with herpetic material; and to Archer, who, in 1809, reported that vaccination ameliorated the course of whooping cough in children. Recent experimental evidence¹⁵ has shown that vaccinia virus induces resistance in mice to an otherwise fatal infection with *Hemophilus pertussis*. Herrmann and associates¹⁶ have demonstrated that tonic convulsions induced in mice by vaccinia virus can be prevented by treatment with heated influenza virus. In the examples just mentioned, implications are noted of "interference" between virus and spirochetes, fungus and virus, virus and bacteria, and, finally, virus and virus. Indeed, numerous examples of interference between related and unrelated animal viruses have been known for several generations.¹⁷ In many of the known examples of viral interference, the exact mechanism of the phenomenon is not understood. It seems clear, however, that in the cases of unrelated viruses, the blocking effect of

one virus by another is not based upon the development of specific antibodies against the virus being blocked.

However vague the phenomenon of viral interference may appear with regard to clinical improvement of patients with recurrent herpes simplex following multiple immunizations with vaccinia virus, we believe that vaccinia virus does exert an interference-like or partial blocking effect on the virus of herpes simplex.

SUMMARY

The cases of 30 patients with recurrent herpes simplex who were treated with multiple vaccinia immunizations are reported. Essentially all patients showed clinical improvement after treatment. The improvement is believed to be the result of some form of viral interference.

This investigation was supported by a research grant, E-733, from the National Institutes of Health, Public Health Service. The virus vaccine was provided by Lederle Laboratories Division of American Cyanamid Co., Pearl River, New York.

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Toxic Drugs and Deafness

ROGER E. WEHRS, M.D.

Tulsa, Oklahoma

THE TOXIC EFFECT that some drugs exercise on the hearing acuity has long been recognized. It is known that tinnitus and deafness can be produced by overdosage of the salicylates or quinine. However, the best known offenders in this field are streptomycin and its sister drug, dihydrostreptomycin.

The purpose of this paper is to review the literature on the subject in an attempt to determine the relative toxicity of the various drugs and their site of pathology on the organ of hearing.

As early as 1922, Pohlman and Kranz¹ were experimenting in St. Louis with the effect of quinine, aspirin, and other salicylates on the hearing mechanism. They were handicapped in that they were able to only crudely measure their subjects' hearing. They concluded that although these drugs produced a definite decrease in hearing, recovery occurred in approximately twenty-four hours.

In 1936, Covell² performed an extensive study on the effect of salicylates and quinine on the cochlea of rats. He determined that both drugs altered the mitochondria in cells of the stria vascularis and external hair cells. He believed that the salicylates were direct protoplasmic poisons.

After similar studies, Falbe-Hansen³ found hypertonic degeneration in the cochlear duct. He then formulated the theory that salicylates and quinine produce increased secretion of the labyrinthine fluids and, thus, pressure on the two fenestra. The increased pressure produces a hearing loss and accounts for the symptoms. He also conducted detailed clinical studies with both quinine and sodium salicylate. In his human subjects, the drugs produced aural symptoms, including deafness and vertigo. However, even with massive doses, no permanent loss was demonstrated; the hearing returned to normal in twenty-four to thirty-six hours.

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Waltner,⁴ writing in 1955, presented a case of a 25-year-old patient who, following a tonsillectomy, took a total of 200 5-gr. aspirin tablets over a period of six days.

An audiogram revealed a bilateral perceptive deafness of 40 to 50 decibels with complete recruitment. Caloric testing was normal, and complete recovery occurred in seven days, with the audiogram returning to normal. Because of the rapid recovery, Waltner feels that this entity is due to increased pressure in the labyrinth and, thus, is similar to Menière's disease.

Following Waksman's discovery of streptomycin in 1944 and its widespread use in cases of tuberculosis, it was soon realized that this was a drug of not only great curative powers but of great selective toxicity as well. Most of the literature agrees that streptomycin has a selective effect on the vestibular function, though, in some instances, it may also cause hearing loss. Dihydrostreptomycin, on the other hand, is reported to impair hearing primarily and to frequently destroy the vestibular function as well.

Barr and associates,⁵ in 1949, reported that approximately 40 per cent of a series of patients who had received a total dosage of over 20 gm. of streptomycin showed vestibular nerve lesions, but the risk was small in daily doses of 0.5 to 1 gm. provided the total dosage did not exceed 60 gm.

Glorig and Fowler,⁶ in 1947, stressed vestibular toxicity in treatment with streptomycin. Of 23 patients treated for more than two months, hearing was normal in all except 1, but only 3 had normal labyrinths.

Since 1949, a number of authors have reported hearing losses following dihydrostreptomycin therapy. The doses have varied considerably, and the hearing loss has had its onset either at the time of or up to four months after treatment. The damage ranged from moderate hearing impairment to total deafness.

Falkenflath,⁷ in 1952, found a hearing loss in 10 per cent of patients who had been treated with dihydrostreptomycin over long periods of time. Liden⁸ found that of 10 patients treated with streptomycin, hearing injuries developed in

4 and the vestibular organ was damaged in 7, while in those treated with dihydrostreptomycin, the corresponding figures were 8 and 5.

In a further study of 150 patients with pulmonary tuberculosis who received 2 or 3 gm. of dihydrostreptomycin daily for at least three months, Glorig⁶ reported hearing losses in 31 per cent. Total deafness developed in one-fourth of the patients and impaired hearing ranging between 30 to 80 decibels in the remainder. Glorig concluded that streptomycin is the drug of choice, since dihydrostreptomycin causes both a loss of hearing and vestibular nerve damage. He emphasized the fact that deafness constitutes a considerably greater handicap than a disturbance of balance.

Nilsson and Bleck⁹ further urge the use of plain streptomycin. The only exceptions would be in cases of an allergy or bacterial resistance to streptomycin and not to dihydrostreptomycin. Neither of these conditions are common. They also caution against the use of combination antibiotic preparations. Most of these contain penicillin and dihydrostreptomycin or mixtures of streptomycin and dihydrostreptomycin with the penicillin. There seems to be no reason to use or encourage the use of dihydrostreptomycin either alone or in combination.

In an effort to localize the focus of attack of streptomycin, Liden performed a clinical investigation utilizing the recruitment phenomenon. Through this procedure, he hoped to determine whether the damage was localized in the end organ or the nervous pathways. Thus, complete recruitment placed the lesion in the cochlea, while absence of this phenomenon pointed to a retrocochlear lesion.

He found complete recruitment in all patients treated for pulmonary tuberculosis with streptomycin or dihydrostreptomycin. He feels that the presence of recruitment in such cases lends weight to the view founded on animal experiments that damage due to streptomycin primarily affects the sensory organ. However, in a group of children who had had tuberculosis meningitis, the recruitment phenomenon was absent in 3 of the patients. These cases were thought to represent retrocochlear lesions and have been interpreted as being caused by the meningitis.

Another drug which has been found to have a toxic effect on the hearing is neomycin, and it has been responsible for many cases of deafness following its experimental use.

Riskier¹⁰ and associates did a beautiful piece of work in Sweden on the toxic effect of the mycins on experimental animals. They found that neomycin exerts a selective toxic effect on

the acoustic function and produced complete deafness by destroying the organ of Corti. Destruction of the acoustic tubercle was also noted where a number of ganglion cells were destroyed. However, when used topically in animals with artificial perforations in their eardrums, no toxic effect was noted. Because of its pronounced nephric as well as cochlear toxicity, neomycin has been abandoned as a systemic antibiotic.

Riskier and associates performed similar experiments with streptomycin and found that the histologic findings did not compare in severity to the clinical findings. Even in the guinea pig with abolished vestibular function, there was no change in the macula of the utricle, saccule, or cochlea. However, there were swollen ganglion cells with ill-defined contours but visible nuclei. They concluded that the mycins attack the peripheral sensory cells as well as the central ganglion cells but that the function of these cells may be abolished without demonstrable histologic change.

These authors further state that selective toxicity of the mycins is well known, but the affinity of these drugs for the vestibular and cochlear systems is still unexplained and the mechanism of destruction is entirely unknown. However, of great clinical significance are the facts that the destruction is irreversible and that so far there is no way of preventing damage if the drug is used.

In contrast to this viewpoint, Ozaki¹¹ reported in 1957 that by the intravenous administration of vitamin B₁ (thiamine), he has prevented or even improved the hearing loss due to streptomycin toxicity. He stresses the importance of discontinuing streptomycin treatment at the first sign of toxicity and before the administration of vitamin B₁ is begun. He administers 100 mg. of streptomycin every day and follows the patient's progress with daily audiograms. If improvement is noted after ten days, he continues the treatment once or twice a week for six months.

He emphasizes the facts that individual sensitivity as well as dosage are important. Symptoms developed in 1 of his patients after taking only 2 gm. of streptomycin. He states that otalgia is an early symptom and precedes the tinnitus and acoustic impairment. Ozaki presented 7 cases, and his audiograms are convincing. One showed a 30-decibel hearing improvement.

As far as can be determined, no other author has reported hearing improvement by merely discontinuing streptomycin therapy, and many report that further impairment may occur after

the patient has ceased taking the drug. However, he does not differentiate between the cases treated with streptomycin, dihydrostreptomycin, or a combination of the two.

SUMMARY AND CONCLUSIONS

A review of the literature on ototoxic drugs is presented. Although the salicylates and quinine may produce abnormalities of the hearing mechanism, including deafness, these defects have never proved to be permanent. Of all the drugs

in current use, dihydrostreptomycin is by far the most dangerous, for it destroys the hearing primarily and its effects may begin several months after the conclusion of therapy. Streptomycin, on the other hand, has the same bacteriologic spectrum as dihydrostreptomycin but is primarily toxic to the organ of balance. Therefore, there appears to be little reason to use dihydrostreptomycin either alone or in combination with other drugs except under the most unusual circumstances.

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IN THIS ERA OF ANTIBIOTICS, lateral sinus thrombosis caused by chronic otitis media must not be forgotten. Atypical cases are being encountered throughout the country.

Haphazard antibiotic therapy of otitis media without myringotomy may lead to a relatively asymptomatic chronic illness accompanied by intracranial extensions, chiefly thrombosis of the lateral sinus.

The rules established over twenty years ago still apply to the treatment of mastoid disease. They include removal of affected structures, adequate drainage of the infected area, and prevention of dissemination.

If symptoms of lateral sinus thrombosis exist or if, at mastoidectomy, the jugular vein appears abnormal, the best and most conservative approach is venal ligation before sinus manipulation in order to prevent possible dislodgment of an embolus into the circulation.

HOMER KINNICK, M.D., and DAVID MYERS, M.D., Temple University, Philadelphia. *Arch. Otolaryng.* 68:156, 1958.

Some Responsibilities of the Physician in the Care of the Emergency Room Patient

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THE PHYSICIAN'S responsibility in the care of the emergency room patient has been the subject of numerous articles in the surgical and medical literature. For the most part, these reports are concerned principally with the care and management of the severely injured patient.¹⁻⁴ However, as the great bulk of cases seen in the emergency room consist of soft tissue injuries in ambulatory patients, this paper is directed primarily to their initial treatment with emphasis on wound care.

In addition, I wish to discuss briefly the responsibility of the medical profession in the management of an emergency room service in the light of the increased importance the emergency room is assuming in most communities.

EARLY WOUND MANAGEMENT

Wound care must be distinguished from wound suturing. The former must conform to surgical principles, whether the wound is major or minor in nature. Hence, every wound requires a certain sequence of events in its preparation. All wounds are contaminated, and it is the physician's responsibility to prevent further contamination as soon as they come under his care. Therefore, the following procedures should be employed for every wound—large or small.

1. Be sure that all personnel assisting in the management of the patient wear masks, caps, and gloves.

2. Provide for adequate anesthesia.

3. Cover the wound with sterile dressing, and clean the adjacent skin edges with mild soap and water. This preparation should be as efficient as if one were scrubbing his hands for an elective surgical procedure.

4. Drape the wound with sterile skin towels.

5. Irrigate the wound with copious amounts of normal saline solution.

6. Remove all devitalized tissue and foreign material, and irrigate the wound again with normal saline solution.

7. Secure hemostasis.

8. Remove drapes and gloves, and, with clean gloves, cover the wound again with sterile dressing and wash the skin again with soap and water.

9. Redrape the wound, and the repair is in order.

The aforementioned may seem to be rather rigid principles to apply to all wounds, particularly minor lacerations. Nevertheless, they are basic surgical principles of wound care. Dabbing various antiseptic solutions in and about a wound serves little purpose in any wound preparation. In addition, no amount of antibiotics ever replaces adequate wound care.

In most instances, a minor laceration treated in a civilian practice can be closed primarily. Fine catgut, preferably 0000 plain, is used to obliterate the subcutaneous dead space and, when employed, should be kept at a minimum. Sutures of 00000 fine silk or nylon are preferred for skin closure. A fine, dry gauze dressing or teflon is employed as the final dressing. In our institution, dressings treated with ointments are discouraged.

Occasionally, delayed closure of a minor laceration is required, principally those incurred during a time of disaster, such as a tornado, and in wounds simulating a wartime injury. Furthermore, bite wounds, whether human or animal in origin, are best treated by delayed closure.⁵ Exceptions to this rule are bite wounds involving the face.

Certain types of lacerations require special technics for their closure. In this regard, Davenport⁶ has recently emphasized this aspect of wound care, with particular attention given to the repair of partial skin avulsion and trap-door and oblique types of lacerations involving the face. When wounds of this nature are closed in the conventional manner, scar formation develops in the direction of the wound, resulting in an elevated ridge of scar tissue. On a smooth skin surface like the face, this ridge becomes unduly prominent and leads to considerable disfigurement. To circumvent this condition, Daven-

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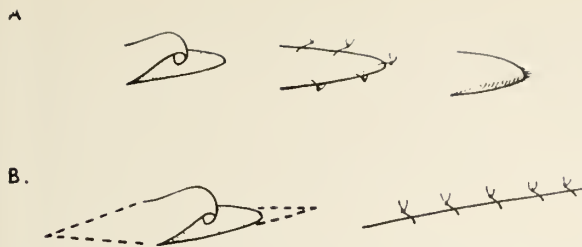


Fig. 1a. Trap-door type of laceration and contraction effect that results when such a wound is closed in the usual manner. (b). Suggested method of closure with total excision of partially avulsed segment and adjacent skin margins. (Reproduced with permission from DAVENPORT, G.: J.A.M.A. 166:1324-1326, 1958).

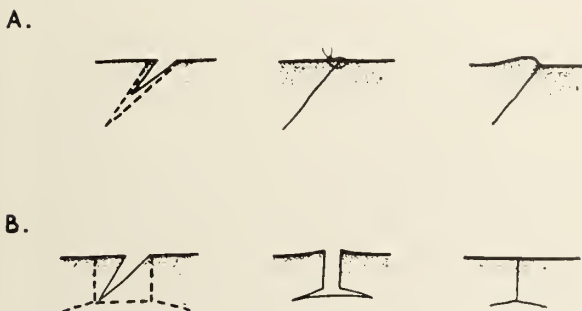


Fig. 2a. Oblique type of laceration and the resulting prominent ridge of scar tissue due to its contraction in the direction of the wound. (b). Proposed closure with development of perpendicular skin margins so contraction is distributed equally to each margin. (Reproduced with permission from DAVENPORT, G.: J.A.M.A. 166:1324-1326, 1958).

port suggests excising the wound edges so that they become perpendicular, and, in this manner, the scar formation is equally distributed to each wound margin. His methods of repair are graphically illustrated in figures 1 and 2 and are self-explanatory.

EMERGENCY ROOM MANAGEMENT

The emergency room service has been defined as a medical unit which has as its primary function the treatment and care of the acutely sick and injured.⁷ In this country, most emergency room services have been extended, and, in addition, they serve as a place to perform minor surgery and administer parenteral injections and as a dressing station for the postsurgical patient. Furthermore, the general public increasingly tends to bypass the physician and seek advice and care from the emergency room for conditions they consider to be urgent. In some areas, the emergency room is considered a health center for the community. If this pattern of medical care continues to persist—and present studies indicate that it will⁸—the emergency room in many

communities will require a reappraisal to meet this changing concept of medical care.

Suffice to say, numerous problems will have to be solved. However, first and foremost will be the responsibility of the medical profession to insure adequate care and management of the sick and injured. In many institutions, this will require that the emergency room service be staffed by full-time physicians. The type of physician qualified for such duties is difficult to define. However, the experiences gained during World War II and the Korean campaign and from communities in which disasters such as hurricanes and tornadoes have struck indicate the value of an experienced physician who is primarily concerned in directing the management of injured and acutely ill patients. The similarity of practice under wartime and disaster conditions is comparable to many present-day emergency room services and is even more obvious with the possibility of an atomic attack and the problem of managing mass casualties.

The foregoing has been further elaborated on by Howell and Buerki,⁹ and their comments are worthy of repetition: "The emergency room should be a major source of expert diagnosis and treatment in almost any community, a vital factor in hospital-public relationship, since its professional reputation often rides on the fate of patients' care in its emergency unit."

It is apparent that the emergency room staffed by experienced physicians is the ultimate answer. In many instances, the cost of maintaining, as well as obtaining, such physicians will be expensive, and the question, "Can we afford it?" will be asked. The answer to this is, "Can we not afford it?" In the meantime, we must do the best we can with that which we have available. However, at the same time, the medical profession is required to give serious consideration to the reappraisal of the purpose and function of the emergency room service with respect to its increased importance in most communities.

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Rheumatic Fever: a Review

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THIS PAPER IS BASED ON my experience during the ten-year period 1949 to 1958, inclusive, with 135 children who had acute rheumatic fever and on a review of the literature.

Hippocrates, who is believed to have been born in 460 B.C., wrote probably the first case report of a disease very much like that which we call rheumatic fever.¹ The next mention of the disease was by Aretacus in 100 A.D. Aristotle referred to polyarthritis in his writings, and Galen also described arthritis. Baillou, in 1642, was the first to use the term rheumatism in describing acute polyarthritis as a separate disease. Sydenham made a life study of rheumatic fever and, in 1676, distinguished acute rheumatism from gout. He not only described chorea but also described a juvenile form of polyarthritis. Hogarth, in the early eighteenth century, coined the term "rheumatic fever" and, in the late eighteenth century, described the cardiac symptoms. In 1728, Boerhaave recognized that the disease invades "sometimes the brain, lung, and bowels." Twenty years later, Storck described pleural and pulmonary involvement in rheumatic fever, which he corroborated by post-mortem examinations. Pulteney, in 1761, Baillie, in 1797, and Laennec, in 1819, first recognized the involvement of the pericardium in rheumatic fever. In 1786, Lettsom recorded a description of a typical case of fatal rheumatic fever in a child. Piteairn, in 1788, and Jenner, in 1789, were the first to associate rheumatic carditis definitely with rheumatic polyarthritis. Wells first described rheumatic nodules in 1810; however, the first comprehensive clinical description of subcutaneous nodules was written by Barlow and Warner in 1881.² In 1831, Bright recorded instances of "roseola annulata" in association

with chorea and also pointed out the close relationship between chorea and "affections of the pericardium." In 1835, Bouillaud emphasized the constant association of rheumatism and heart disease, stressing the frequent occurrence of endocarditis as well as pericarditis with rheumatism. In 1843, Watson recognized rheumatic fever as essentially a disease of childhood. He stated that "the younger the patient is who suffers acute rheumatism, the more likely will he be to have rheumatic carditis." In 1889, Cheadle described the association of tonsillitis, polyarthritis, carditis, and chorea with rheumatic fever. He recognized erythema marginatum and other rashes which occur in the disease. The Aschoff body was described by Aschoff in 1904.³

Infection with group A hemolytic streptococci is now recognized as the only established inciting factor in acute rheumatic fever.⁴⁻⁷ The possibility that other infections or injuries may also act as inciting agents in rheumatic fever has long been considered, but there is no clearly documented evidence that any of these can initiate the disease without the intervention of an associated streptococcal infection. While the streptococcus must be considered the specific inciting agent in rheumatic fever, other factors obviously participate in the pathogenesis of the disease, since rheumatic fever does not develop in all patients with recognized streptococcal infections. Environmental conditions, such as poverty and overcrowding, have not been adequately assessed, and it is possible that they may influence the incidence of streptococcal disease. The roles of heredity, nutrition, and other host factors are likewise poorly defined, and much further work will be needed before their true significance in the disease can be established. Uchida⁸ feels that rheumatic fever is determined primarily by an inherited susceptibility of the

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host and that the eventual development of the disease depends upon exposure to certain environmental factors. The exact method of genetic transmission is as yet uncertain. Based upon the figures from the Hospital for Sick Children at Toronto in which 420 children from 104 families were analyzed, the chance of having a second rheumatic child is approximately 10 per cent.

With few exceptions, bacteriologic studies done during the onset of acute rheumatic fever have revealed the presence of group A streptococci. Almost all patients with untreated group A streptococcal infections in whom late complications may or may not develop continue to harbor the infecting organism in the throat for many months and, in some instances, years. The persistence of streptococci beyond the stage of symptomatic infection may represent a hazard to the individual harboring these organisms. Delayed treatment of streptococcal infections—treatment initiated after all symptoms and signs of the respiratory illness have subsided—reduces the incidence of subsequent rheumatic infection. Such treatment eradicates the infecting organism but does not appreciably inhibit the antistreptolysin O response. Rheumatic fever can often be prevented even if specific treatment is begun quite late in the course of a streptococcal infection. Significant increases in antistreptolysin O titer develop in approximately 70 to 80 per cent of patients with untreated streptococcal infections. Among patients with acute rheumatic fever, 85 per cent in 1 series showed a significant increase in antistreptolysin O, and 90 per cent showed a titer of 250 units or more at the time they were hospitalized for rheumatic fever. The fact that penicillin treatment of streptococcal infections both inhibits antibody formation and prevents rheumatic fever suggests that antibody formation may have something to do with the development of this late complication. More recent evidence suggests the importance of the persistence of streptococci in body tissues in the pathogenesis of the disease. On the average, patients with acute rheumatic fever produce antibodies in larger amounts than patients with uncomplicated streptococcal infections. Stetson⁹ showed that the attack rate was 2.7 per cent regardless of the initial antistreptolysin O titer. The attack rate of rheumatic fever is not significantly greater in the child than in the adult.

A beta hemolytic streptococcal infection may be defined in terms of those clinical, epidemiologic, and laboratory features which are easily recognized by the practicing physician.¹⁰ The clinical and epidemiologic syndromes are as

follows: (1) scarlet fever; (2) pharyngitis, with or without tonsillitis, manifested by local redness, edema, exudate, and elevated temperature and associated with enlarged tender lymph nodes at the angle of the jaw, leukocytosis, or a positive throat culture; (3) complications of upper respiratory disease or syndromes which are frequently due to the streptococcus, such as otitis media, mastoiditis, and erysipelas; (4) upper respiratory infection occurring in individuals living in households or in close contact with patients with obvious streptococcal disease; and (5) symptoms at all suggestive of streptococcal disease in known rheumatic patients or their familial household contacts.

As with other laboratory tests, a throat culture may be misleading unless properly taken, processed, and interpreted.¹¹ For example, a common error is to confuse the nonpathogenic green, alpha streptococci with those which produce upper respiratory infections. It is, therefore, essential for the physician to have some knowledge of the entire procedure, both to insure that the culture is correctly taken and handled and to evaluate the reports received from the laboratory. Beta hemolytic streptococci are most easily identified on sheep blood agar plates. An adequate culture of the throat should be obtained by depressing the tongue and rubbing the swab over each tonsillar area and the posterior pharynx. Any area exhibiting exudate should also be touched. The swab should be inoculated onto a blood agar plate in one or two hours. The objectives in streaking a blood agar plate are to avoid drying of the specimen by delay, to insure adequate distribution so that well-isolated colonies will be present for examination, and to provide subsurface as well as surface hemolysis for observation. Inoculated plates are incubated overnight at 37° C. A complete laboratory report indicates the relative number of colonies of beta hemolytic streptococci that are present as well as the type of hemolysis. Hemolytic streptococcal infection during the first four years of life is characterized by the lack of an acute onset, little or no fever, rhinorrhea, a protracted course, and the occurrence of frequent suppurative complications.^{12,13} The youngest infants may have low-grade fever, diarrhea, or vomit for a week or less with a persistent thin nasal discharge and excoriation and crusting around the external nares. Accurate etiologic diagnosis in these cases requires bacteriologic study of the nasopharyngeal flora and the purulent discharges. After the fourth year, the disease pattern changes so that progressively more of the infections are associated with an

acute febrile onset, sore throat, exudative tonsillitis and pharyngitis, and, occasionally, a skin rash. These different responses between children of various ages to group A hemolytic streptococci may be the result of serial reinfection, presumably by strains of different serologic types. The proportion of infections which are either mild, atypical, or asymptomatic is not well established. In young adults, they account for perhaps 40 per cent of infections, and, in infants, they are thought to occur even more frequently.

In the United States, the incidence of rheumatic fever varies from about 0.1 to 6 per cent. There are roughly 1,000,000 people with rheumatic heart disease in the United States, and about 300,000 of these are school children.¹⁴ The onset of rheumatic fever usually occurs in childhood, especially between the ages of 6 and 10 years, with the maximum rate at age 8.

The pathogenesis of rheumatic fever may be outlined as follows: a first phase of one to three days' duration; an asymptomatic interval of about eighteen days; an acute phase of rheumatic activity; and a convalescent phase of variable duration.^{15,16} About 20 per cent of the cases occur in children under 5 years of age, 50 per cent in those between the ages of 5 and 8, and 25 per cent in persons over 8 years.¹ By 15 years, 70 per cent of the affected children have already acquired the disease.¹⁷ The initial symptom of rheumatic fever is growing or joint pains in 25 per cent of patients,^{1,15,16} chorea in 25 per cent,^{1,15-17} polyarthritis in 25 to 50 per cent,^{1,15-17} active carditis in 30 to 65 per cent,^{17,18} and carditis without apparent activity in 10 per cent.¹ According to Wilson,¹ 85 per cent of the children have one or more recurrences in the first eight years. Cohn and Lingg²⁰ found 75 per cent had recurrences in the first thirteen years, and Bland and Jones^{18,19} discovered 60 to 70 per cent had repetitions of clinical rheumatic fever during the first ten years. The chance of a recurrence is 1 in 5 during the first five years, 1 in 10 during the second five years, and 1 in 20 during the third five years.^{18,19}

The mean duration of the disease in patients who die is six to fifteen years.^{1,17} Thirteen per cent of the patients die before the end of one year,^{1,21} 10 to 12 per cent at the end of five years,^{1,18,19,21} 17 to 29 per cent at the end of ten years,^{1,21} and 30 per cent within twenty years.^{18,19} According to Cohn and Lingg,¹⁷ 31 per cent do not survive childhood, and 34 per cent do not survive adolescence. After 15 years of age, 4 out of 5 children survive.¹ The prognosis is worse when patients show signs of systemic saturation.²¹ Pronounced severity of the initial

attack of rheumatic fever, a greatly enlarged heart, and congestive failure early in the disease are serious prognostic features. Bland and Jones found that by the end of twenty years, signs of rheumatic heart disease had disappeared in 16 per cent of those who showed rheumatic heart disease in their initial illness and had regressed in an additional 15 per cent, a total of 31 per cent with improved cardiac status. Of those patients without detectable rheumatic heart disease in their initial illness, the condition developed during this period in 44 per cent, more often in the first ten years. Physical activity is restricted little or not at all in 80 per cent of those who survived twenty years from the onset of rheumatic fever. From the data of Bland and Jones,^{18,19} it appears that the 20-year outcome may be considered satisfactory in approximately 56 per cent of 1,000 cases of rheumatic fever, while early death or crippling heart disease was observed in 44 per cent.

Chronic rheumatic heart disease has declined as a cause of death from 13.5 per 100,000 industrial policyholders of the Metropolitan Life Insurance Company in 1950 to 11.6 per 100,000 in 1957.^{22,23} In the same period, deaths from all causes have risen from 638.7 per 100,000 to 657.1 per 100,000. The reduction in mortality reflects both a lessened incidence of the disease and a distinct improvement in survival. The survivorship record of the children in a long-term follow-up of nearly 3,000 young Metropolitan industrial policyholders who had their acute attack during the years 1936 to 1938 is remarkably good. The survivorship rate after nineteen years was about 90 per cent for the children without heart involvement at first observation, except for boys 10 to 20 years of age who received nursing care. For them, the rate was 84 per cent. Among children with heart involvement at first observation, the survivorship rate exceeded 75 per cent for the girls under age 10 and exceeded 60 per cent for the older girls and for all of the boys. The record of mortality and survivorship was generally better for the girls than for the boys and for the younger rather than for the older children. Most of the deaths in this follow-up experience were reported as due to rheumatic heart disease. The most notable feature of the study is the marked reduction in mortality from subacute bacterial endocarditis, a complication of rheumatic fever which two decades ago was almost invariably fatal.

DIAGNOSTIC CRITERIA

The diagnostic features of the disease have been divided by Jones into major and minor categories

dependent upon their relative occurrence in rheumatic fever and in other disease syndromes from which this illness must be differentiated.¹⁰ These major and minor categories have no significance beyond their diagnostic import. The presence of two major criteria or one major and one minor criteria indicates a high probability of rheumatic fever. One combination, however, polyarthritis, fever, and elevated sedimentation rate, is the weakest of all combinations of major and minor criteria. Major diagnostic criteria are carditis, as manifested by murmurs, increasing cardiac enlargement, pericarditis or congestive failure, polyarthritis, chorea, subcutaneous nodules, and erythema marginatum. Minor diagnostic criteria are fever, arthralgia, prolonged PR interval in the electrocardiogram, increased erythrocyte sedimentation rate, presence of C-reactive protein or leukocytosis, evidence of preceding beta hemolytic streptococcal infection, and previous history of rheumatic fever or the presence of inactive rheumatic heart disease.

It is of considerable importance to distinguish between growing pains, the joint and muscle pains of the quiescent rheumatic patient, and those associated with rheumatic activity.²⁴ When such complaints are continuous and uninfluenced by the application of heat or massage, other clinical and laboratory criteria of rheumatic activity are usually discovered on careful examination. It is hazardous to make a diagnosis of rheumatic disease in children on the basis of polyarthritis alone. When polyarthritis occurs as a single manifestation following a beta hemolytic streptococcal infection, the diagnosis of rheumatic fever is not always substantiated. All children with definite rheumatic polyarthritis not only present clinical and laboratory evidence of rheumatic disease but few escape obvious cardiac damage. About 25 per cent of the patients have polyarthritis initially, while about 40 to 66 per cent will have polyarthritis at some time.^{15,16,18,19}

Skin manifestations occur in 8 to 12 per cent of children with rheumatic fever.^{15,16,18,19} They are usually associated with other signs of rheumatic fever. Erythema annulare, also known as erythema marginatum, is an evanescent macular lesion which resembles ringworm. It has a pale, pink border or ring with central clearing. It may occur any place on the extremities or body. It may appear before any other rheumatic manifestations have been recognized, or it may occur in well-advanced rheumatic disease. It may also appear as an isolated disease. Erythema nodosum has been associated with tuberculosis, streptococcal infections, rheumatic

fever, and coccidioidomycosis, and its presence should focus attention on these diagnostic possibilities. The most satisfactory interpretation seems to be that erythema nodosum can occur in any infectious disease, the cutaneous manifestations being based on hypersensitivity. Though erythema annulare is the most typical of the skin manifestations, erythema multiforme, purpura, petechiae, and urticaria may occur. Subcutaneous nodules occur in 10 to 20 per cent of patients with rheumatic fever.^{15,16,18,19} They are usually associated with severe heart disease, and they may occur during the stage of healing. Some children who have numerous and universally distributed crops of nodules recover from an acute rheumatic episode and seem to present a good outlook for the future. In other patients, subcutaneous nodules develop in the terminal stage of the disease. These small structures are about the size of a pea and appear under the skin, on the tendon sheaths at the elbows, knees, ankles, and fingers, and often over the occiput where they may be bigger and painful.

Nosebleeds occur in almost a third of children with rheumatic fever.^{18,19} Their repeated occurrence during obscure ill health should arouse suspicion. Severe nasal bleeding is not seen as frequently as formerly.

Chorea (rheumatic encephalitis) has been reported to occur in 50 per cent of all rheumatic fever patients during some phase of their illness.^{15,16,18,19} In a twenty-year follow-up study made by Bland and Jones,^{18,19} the mortality due to rheumatic heart disease twenty years after onset of rheumatic fever was 59 per cent among those with an initial rheumatic manifestation other than chorea, as compared with 12 per cent in those whose initial rheumatic manifestation was chorea alone. Data obtained by Taranta and Stollerman²⁵ and Harris and associates²⁶ suggest that the symptom complex of chorea can exist apart from the disease of rheumatic fever. Rheumatic chorea would be suggested by abnormal levels of one or preferably two acute phase tests and at least one elevated streptococcal antibody titer. Nonrheumatic chorea would be suggested by acute phase tests and streptococcal antibody titers within normal limits. Girls suffer from chorea more than boys. The earliest complaints are those of nervousness and clumsiness. Then uncontrolled involuntary movements develop, and the patient has difficulty in walking. The purposeless motions may interfere with all normal activity and may involve dropping objects, facial grimacing, excessive flourishing of the hands, emotional instability, and mental dullness. In hemichorea, the manifestations

are limited to the extremities on one side of the body. With so-called "limp" chorea, the patient walks as if he had hemiparesis. Apparent residual brain damage may occur after repeated attacks of chorea.

Children who present signs of bronchitis during the course of rheumatic activity do not do well as a rule. These cases are usually associated with severe carditis. Rheumatic pleurisy is more common and is usually indefinite, evanescent, and easily controlled. Rheumatic pneumonia usually carries a poor prognosis. In its severe form, it becomes manifest as a fulminating pneumonitis and is almost always fatal. It may also occur as a mild transitory pneumonia. Radiographic evidence of rheumatic pneumonia is usually perihilar and resembles that of congestive heart failure.^{27,28}

Rheumatic abdominal pain may be due to enteritis, pericarditis, perihepatitis, or perisplenitis. I have not had difficulty in distinguishing this rheumatic pain from that of acute appendicitis, but an oral or intravenous dose of salicylate is said to be of help in establishing the diagnosis. I believe that abdominal manifestations of rheumatic activity are not common. Enlargement of the liver without signs of right heart failure is significant of acute carditis and severe rheumatic fever. Nephritis occurs somewhat more frequently in patients with rheumatic fever and rheumatic heart disease than is usually suspected, and the heart may become involved despite predominant involvement of the kidneys in certain cases of nephritis. In a recent clinical and post-mortem series, 4.2 per cent of the nephritic patients had acute or chronic rheumatic involvement of the heart, while, in the rheumatic series, 5 per cent had acute or chronic glomerulonephritis.²⁹ Taran²⁴ describes a specific nephritic syndrome—renal epistaxis—which occurs in association with acute carditis. This syndrome is manifested by profuse bleeding from the kidney and severe secondary anemia.

The most common and serious manifestation of rheumatic fever is carditis. This condition is always found in fatal cases and its presence, associated with other evidence of rheumatic fever, can be assured with the appearance of significant murmurs, progressive cardiac enlargement, pericarditis, or congestive failure in persons under the age of 20.^{18,19} When there is no evidence of congenital heart disease or renal disease, the development of signs of cardiac decompensation in a child must be considered of rheumatic origin until proved otherwise. It is estimated that about 10 per cent of children with rheumatic fever have a cardiac murmur without

other evidence of the disease. The physical signs of early involvement of the heart are essentially those of mitral and aortic valve injury, usually associated with cardiac enlargement. The unstable character of the cardiac rate, the ever-changing heart sounds and murmurs, and the disturbance in relationship of systole to diastole are the primary criteria for rheumatic carditis. The cardiac rhythm in acute carditis simulates embryocardia.²⁴ Taran²⁴ found that all patients who died while they had active rheumatic fever or as a result of active rheumatic heart disease in whom histologic examination of the heart was made showed signs of pericardial involvement. A pericardial friction sound is sharply localized, rough, and superficial. A blowing systolic murmur maximal at the apex of grade 3 or greater intensity is the most common auscultatory finding of mitral insufficiency. It is usually well transmitted laterally to the left lung base. Lesser degree of mitral regurgitation may be temporarily present, especially in children, as a result of other mechanisms than actual valve deformity. Transient murmurs of this degree may accompany cardiac dilation during diseases other than rheumatic fever, especially when severe anemia is present.

"Functional murmurs" or "innocent murmurs," which are common in children, may be due to valvular pathology with minimal clinical disease. These murmurs are heard more often over the pulmonic area but may be heard at the apex, within the apex, or over the entire precordium. A clinical and graphic study was made recently in 500 unselected children between the ages of 4 and 17.³⁰ From the clinical point of view, a medium or loud systolic murmur was heard in 23.3 per cent of the cases. Even though the majority of the systolic murmurs were pulmonic, a fair number were heard at the apex and over the aortic area. This study seems to indicate a mitral origin in over one-half and a pulmonic or aortic origin in the rest. The authors present 2 alternative hypotheses:

1. That the murmurs are caused by a discrete rheumatic process which has different characteristics from the more severe forms and which, in the majority of cases, is not followed by important valvular lesions.
2. That the murmurs are due to nonrheumatic, possibly allergic, valvulitis, with no tendency to increase in severity.

In either case, they consider it impossible to separate these murmurs from those of valvular lesions which have greater clinical significance. Among 6,413 cases referred to Dr. Paul White for cardiovascular opinion, rheumatic heart dis-

case was found in 27 per cent of all patients with loud apical or aortic systolic murmurs without diastolic murmurs and in only 3 per cent of those with lesser murmurs and in none of those without murmurs.³¹ Those with the loudest murmurs lived shorter lives than those with lesser murmurs. There was no evidence that the prognosis per se was more unfavorable for patients with aortic systolic murmurs without diastolic murmurs than for those with the corresponding apical systolic murmurs. Moderately to much enlarged hearts contributed to an early death in all patients. The aortic valve is often involved in rheumatic heart disease. As a matter of fact, aortic regurgitation occurs more frequently than is generally appreciated. Clinically, the murmur is described as a faint blowing, diminuendo, diastolic murmur, audible over the aorta and of maximum intensity in the third left interspace along the sternal border. It is transmitted in the direction of the regurgitant stream, sometimes as far as the apex. This murmur, in contrast to the diastolic murmur of mitral stenosis, begins immediately after the second sound. Auscultation with the Bowles diaphragm chest piece facilitates perception of this low intensity murmur.

The presystolic Austin Flint murmur may be heard in any form of well-developed aortic insufficiency. It is indistinguishable in quality and timing from the presystolic murmur of mitral stenosis. A loud and snapping first apical sound is a fairly common sign of mitral stenosis. It may even be the first suggestion of fibrosis and early stenosis. It is more significant when associated with an accentuated second pulmonic sound. The rapid flow of blood from auricles to ventricles during the early diastolic period is thought to be the primary factor responsible for both the third heart sound and the early diastolic murmur. The appearance of a third heart sound in a patient with active rheumatic carditis is important because it may presage the appearance of an apical diastolic murmur.

A soft, short, mitral diastolic murmur, the Carey Coombs murmur, may occur in active rheumatic carditis when the mitral valve is scarcely altered. It is thought to be due to turbulence set up by inflammatory thickening of the mitral cusps. This murmur occurs early in the course of rheumatic carditis and may disappear as activity subsides. After the mitral valve has become scarred and stenosed, an apical presystolic murmur may be heard. The presystolic murmur occurs in late diastole, usually sharply limited to the apex. It is described as crescendo, terminating with a loud snapping first sound. In the patient with longstanding rheumatic dis-

ease and chronic congestive heart failure, the tricuspid valve may become involved either by actual rheumatic process or by an irreversible dilation of the tricuspid ring. Most patients show a leukocytosis during the first two weeks of rheumatic carditis. After the white blood count has returned to normal, clinical evidence of active rheumatic disease may still exist. An increase in the pulse rate out of proportion to the temperature is evidence of continued rheumatic activity. On the other hand, a normal pulse rate is no assurance that the rheumatic activity is quiescent. An anemia may be found at the onset of rheumatic fever. However, this is not a test that can be relied on to help with diagnostic problems, as evidence of rheumatic activity may coexist with a normal hemoglobin. A sharp reduction in vital capacity may be one of the earliest signs of left ventricular failure. It has been suggested that a low vital capacity in a rheumatic patient should be considered a good index of rheumatic activity in the heart muscle. A normal vital capacity may occur with active rheumatic fever, so it fails to be of specific diagnostic help.

Radiographic evidence of cardiac enlargement occurs primarily during active rheumatic disease. The increase in heart size is generalized in character, though left ventricular and left auricular enlargement may occur early. Posterior enlargement of the left auricle is demonstrated best in the oblique view after a barium swallow. Advanced valvular disease may occur with no cardiac enlargement visible on the radiograph. The QT interval, which measures the duration of electrical systole, is prolonged in hypoglycemia and hypopotassemia and shortened in hypercalcemia. Quinidine prolongs the QT interval while digitalis shortens it. Carditis causes a prolongation, while pericarditis may cause a pronounced shortening of the QT interval.^{32,33} Measurement of the QT interval in patients with rheumatic fever is an additional laboratory aid which may help in determining the presence of active carditis. The prolongation of the QT value in polyarthritis and in chorea in the absence of other clinical findings should suggest further observation for the possible presence of a mild carditis. In evaluating patients whose QT interval is above normal and in whom the presence of active carditis is otherwise questioned, consideration must be given to the fact that the QT interval has exceeded the upper limits of normal in some normal children.³³ Serial electrocardiograms may show changing values for the PR intervals as well as prolongations of the PR interval during active rheumatic fever. Electrocar-

diographic evidence of rheumatic fever is not usually specific enough to aid in early diagnosis.

Group A streptococci are made up of a number of recognized cellular components and give rise to a variety of extracellular products. This list includes many substances that are both antigenic and biologically active. The determination of antistreptolysin O is in many respects the best procedure available for routine use.^{34,35} Not only is the percentage of patients showing an antibody response to this substance as high as that to any other single antigen, but the method of Todd is well standardized in terms of the units of antibody measured. A detectable rise in the antibody appears in the second week after the streptococcal infection, and the peak is usually reached between the third and fifth weeks. Symptoms of rheumatic fever usually become manifest before the antibody response reaches its maximum. Following a streptococcal infection, the changes in gamma globulin level are similar to the changes in specific antibody titers. A number of changes occur in the blood during the acute phase of infections which, though nonspecific, may prove of help in the early diagnosis and measurement of activity in rheumatic fever. The changes that bring about an increased erythrocyte sedimentation rate may serve as an index of the presence of active disease.

In 1930, Tillett and Francis³⁶ demonstrated that acute-phase serum from patients with pneumonia and other infectious diseases forms a precipitate in the presence of dilute solutions of the somatic C-polysaccharide of the pneumococcus. The C-reactive protein is not normally present in the blood but appears during the acute phase of infectious disease and disappears with clinical recovery. While sera from patients with acute rheumatic fever always contain C-reactive protein, sera from many patients with diseases which must be differentiated from rheumatic fever, other collagen diseases, various infections, and malignant diseases may contain C-reactive protein in relatively large quantities. Regardless of its lack of specificity, detection of C-reactive protein in the serum may be a useful index of disease activity in rheumatic fever. Its absence from the serum points the diagnosis in other directions, and its detection in high concentration renders a tentative diagnosis of rheumatic fever more acceptable. Elevations in serum mucoproteins, combinations of amino sugars (hexosamines) with globulin, are found in children with bacterial and virus infections, collagen diseases, malignancies, and rheumatic fever. Elevated serum levels of these substances were observed at some time during the illness of all but

3 of 40 patients with acute rheumatic fever but in none of 40 patients with convalescent rheumatic fever and in only 3 of 40 patients with inactive rheumatic fever.³⁷ Extensive investigations have shown that the serum level of non-specific hyaluronidase inhibitor is elevated in many diseases and that, like the sedimentation rate, C-reactive protein, and mucoproteins, hyaluronidase inhibitor levels return rapidly to normal when the clinical activity of infection, nephritis, and rheumatic fever subsides.

Because of the variety of clinical signs and symptoms of rheumatic fever, the diagnosis may be difficult initially and may involve a great number of other diseases with similar signs and symptoms. Tics or habit spasms are common and are always repeated with the same pattern. The twitching of the lip or arm or the shrugging of a shoulder is always the same, with no muscle spasm of other parts of the body. Hemichorea may be confused with a brain tumor or poliomyelitis unless the reflexes are checked carefully and a complete examination performed, which should include a brain wave in borderline patients. Children with aseptic meningitis may have confusing signs, which are resolved by a lumbar puncture. The rapid pulse and elevated temperature of hyperthyroidism are easily confused with rheumatic carditis, especially if a heart murmur exists. If the expected improvement does not occur after corticosteroids have been administered for a few days, diagnosis should be questioned. A protein-bound iodine determination or I¹³¹ uptake determination will establish the diagnosis.

The limp and acute onset of acute hip synovitis may superficially resemble rheumatic polyarthritis. This entity occurs almost solely in children under 5 years of age and is not accompanied by swelling of the joint, high fever, or carditis. A radiograph occasionally shows edema about the hip. Cellulitis or osteomyelitis become manifest by high fever, bacteremia, high white blood count, and intense bone pain or soft tissue induration involving areas far removed from the joint. They are not usually associated with evidences of carditis. Acute vascular (anaphylactoid) purpura may show all the signs of rheumatic fever. The eruptions and other manifestations subside quickly after corticosteroid therapy. I have never seen this type of purpura with acute polyarthritis, though the purpura may involve the joint areas, and the children do not seem acutely ill unless, of course, abdominal purpura occurs. Nonspecific leg aches and "growing pains" are so common that the diagnosis is usually evident after the history is taken. Since osteo-

chondritis involves such specific sites as the patella, the tibial tubercle, or the tarsal scaphoid, this condition should rarely be confused with rheumatic fever.

Severe anemias may be associated with heart murmur and malaise and low-grade fever. In sickle cell anemia, abdominal pain may be present, joint pains and fever may occur, and cardiac enlargement and apical systolic murmurs may be found. Any bacterial infection may be confused with rheumatic fever unless it is detected by a careful physical examination, which should be supplemented by laboratory studies, including spinal tap and radiographs of skull, sinuses, chest, and urinary tract. Sinusitis, unresolved pneumonias, and congenital urinary pathology are common, so that a search for them is almost mandatory when fever is prolonged. Visceral rheumatic fever probably occurs more often than is appreciated, and some of the bizarre cases of encephalitis, hepatitis, enteritis, and hilar pneumonia may be manifestations of this disease. The onset of Hodgkin's disease and leukemia is marked by bone pain, joint pain, or spinal pain. The differentiation of congenital heart disease from rheumatic carditis may occasionally require extensive studies, including heart catheterization, and these conditions may occur simultaneously. The correct diagnosis can usually be made by the position and quality of the murmurs or a continuous murmur, the absence of femoral pulsation, the presence of hypertension and cyanosis, the typical cardiac configuration, or evidence of right axis deviation on the electrocardiogram. Cassels³⁸ suggests that dye dilution curves should be used in differential diagnosis. Intravenous injection of Evans blue dye in conjunction with a recording oximeter is said to result in abnormal curves in the presence of shunting lesions associated with congenital heart disease. When typical acute rheumatic fever occurs, diagnosis is not a problem. Usually, suspicious borderline or atypical rheumatic fever proves to be some other disease. In equivocal situations, time and trials with aspirin and corticosteroids may be necessary to decide whether rheumatic fever exists. Endocardial fibroelastosis can mimic almost every other kind of heart disease.³⁹ A myxoma in the left atrium can imitate mitral stenosis.³⁹

PREVENTION

The first attack of rheumatic fever may be prevented by early treatment of the streptococcal pharyngitis or tonsillitis with therapeutic dosages of penicillin for at least seven to ten days.¹⁰ Results obtained with chlortetracycline and oxy-

tetracycline are less satisfactory than those with penicillin, but the tetracyclines may be used in individuals who are sensitive to penicillin. Sulfonamides are ineffective (table 1). It has been demonstrated that the continuous administration of sulfonamides, penicillin, or broad-spectrum antibiotics is effective in preventing rheumatic recurrences (table 2). The broad-spectrum antibiotics are less effective in continuous prophylaxis than penicillin and the sulfonamides. When superimposed streptococcal infection occurs in a rheumatic patient, penicillin should always be used in full therapeutic dosage (table 1). The sulfonamides are unable to eradicate streptococci from the upper respiratory tract. The tetracyclines have been used instead of penicillin in the treatment of streptococcal infection in penicillin-sensitive patients, but their ability to eradicate streptococci is much lower. In case of excessive exposure, as occurs in hospitals or institutions, penicillin should be prescribed in double the dosage recommended for continuous prophylaxis. Prophylaxis must be continued at least to the age of 15 or for five years after the end of the last recognizable attack, whichever is longer. In some patients, continuous lifetime prophylaxis should be recommended.

TABLE 1
TREATMENT OF STREPTOCOCCAL INFECTION¹⁰

Mode of administration		Penicillin	Tetracyclines
Oral	Benzylpenicillin (penicillin G)	250,000 units three times a day for 10 days	0.5 gm. four times a day for 10 days
	Phenoxymethylpenicillin (penicillin V)	Dosage approximately half that for benzylpenicillin	
Intramuscular	Penicillin in oil with aluminum monostearate	300,000 to 600,000 units on the 1st, 4th, and 7th day	
Intramuscular	Benzathine penicillin	1,200,000 units in 1 injection	

TABLE 2
CONTINUOUS PROPHYLAXIS¹⁰

Mode of administration		Penicillin	Sulfadiazine
Oral	Benzylpenicillin (penicillin G)	200,000 units twice a day	Children: 0.5 gm. per day
Oral	Phenoxymethylpenicillin (penicillin V)	100,000 units twice a day	Adolescents and adults: 1.0 gm. per day
Intramuscular	Benzathine penicillin	1,200,000 units once a month or 600,000 units twice a month	

TREATMENT

Treatment of acute rheumatic fever is based on bed rest and the use of corticosteroids, aspirin, penicillin, and digitalis. Bed rest is, of course, mandatory during the acute attack. Bed rest can vary from absolute for the severely ill child to modified for the patient with few or no cardiac symptoms. As soon as the temperature, pulse, and polyarthritis have subsided, most children are restrained with difficulty. As long as they are restricted to the bed at this time, I can't see that the heart is compromised by physical activity in bed. When a downward trend in the sedimentation rate has been established and the C-reactive protein has disappeared from the blood, moderate activity can be started. Most of my patients are in the hospital from ten days to two weeks with the acute illness and then are in bed at home two weeks before they are allowed any activity out of bed. Progression of heart disease is probably due to either smoldering rheumatic activity or recurrences. It is generally advised not to limit the physical activity of a child who recovers from his initial attack with no evidence of valvular heart damage. Children with rheumatic valvular disease should be allowed to exercise without restriction, though they should probably stop short of actual fatigue. A state of relative adrenal insufficiency in patients with rheumatic fever provides rationale for the use of hormone therapy.⁴⁰

A number of reports concerned with the use of steroids in rheumatic fever have expressed pessimism with regard to the prevention of permanent cardiac damage. It is hard to establish a routine for the administration of corticosteroids, but a rough rule would be to give 1 mg. of ACTH per pound daily or 1 mg. of prednisolone per kilogram daily. I give about 10 mg. of prednisolone every six hours until the acute signs of disease begin to subside and then reduce the dose by half daily until all signs are quiescent. Prednisolone, the hydrocortisone synthetic analogue, is relatively inert as far as salt-retaining properties are concerned, though it retains its anti-inflammatory activity. I have not limited salt in the diet unless congestive failure was imminent nor have I given potassium salts routinely. Though some feel that aspirin should be given routinely early in the disease, I'm impressed with the fact that early, adequate doses of corticosteroids prevent cardiac damage. All of my patients with rheumatic fever, regardless of its severity, receive a course of corticosteroid therapy. If congestive failure appears, the child should be treated with digitalis and oxygen. Sodium should be restricted, and physiologic principles

of cardiac care should be adhered to strictly. At the beginning of therapy, all streptococci should be eradicated from the throat by one of the schedules shown in table 1 and the child then started on continuous penicillin prophylaxis.

During the years 1949 to 1958, 135 children with rheumatic fever, age 14 and under, were seen at the Quain and Ramstad Clinic.

The initial symptoms of rheumatic fever were:

	<i>No. of patients</i>	<i>Per cent</i>
Arthritis	68	50
Active carditis	37	27
Chorea	23	17
Skin	4	2.9
Pneumonia	3	2.2

No deaths occurred in patients whose presenting symptom was arthritis or chorea. Among the group with myocarditis and pneumonia as the first symptom, 2 boys and 2 girls died.

	<i>No. of patients</i>	<i>Per cent</i>
Deaths	4	2.9

Among the whole group, the following other manifestations occurred:

	<i>No. of patients</i>	<i>Per cent</i>
Pneumonia	9	6.6
Skin	11	8
Rheumatic nodule	1	
Hepatitis	2	
Appendicitis	1	
Chorea	28	13.3

To illustrate the fact that the early symptoms of acute rheumatic fever may be exceedingly variable, 2 case reports are presented.

CASE REPORTS

Case 1. P.C., a white female, who was born November 14, 1947. Her first clinic admission was on April 10, 1953. One week prior to admission, a blotchy rash had developed on her legs. Examination disclosed a well-nourished child who did not appear acutely ill. Her legs were covered with petechiae and ecchymoses. There was no general glandular adenopathy. The eyes, ears, nose, and throat were normal. There was no heart murmur. The liver, spleen, and kidneys were not palpable. The rectal temperature was 99, weight was 37 lb., and heart rate was 120. The white blood count was 11,000 with a differential of 75 per cent polymorphonuclear neutrophil leukocytes, 20 per cent lymphocytes, and 5 per cent eosinophils. The hemoglobin was 12 gm. The platelet count was 120,000. The peripheral blood smear showed no dyscrasia. Bone marrow taken from the iliac crest was stringy, and no dyscrasia could be demonstrated. A heart roentgenogram showed a prominent pulmonary outflow tract and normal lungs. A diagnosis of acute vascular (nonthrombopenic) purpura was made, and she was treated successfully with cortisone. Her second clinic admission was on November 13, 1957. She had become ill one week previously with cough, malaise, abdominal pain, and fever. The morning of admission, she had begun gasping for breath and when seen was acutely ill. She was complaining of abdominal pain and had a continual cough. The skin was dry, and

no skin lesions were seen. Lymph glands were not palpable. The neck and spine were not stiff or painful. The throat was inflamed, and a purulent postnasal discharge could be seen, which culture disclosed was due to a mixture of alpha streptococci and *Staphylococcus albus*. The eyes and ears were normal. The apex beat was heard at the axillary line in the fourth left interspace. The heart showed a 1 to 1 rhythm. No heart murmurs were heard. The lungs were clear. The abdomen was soft. The liver, spleen, and kidneys were not palpable. The extremities were normal. The nails showed suggestive clubbing. The genitalia were normal. The rectal temperature was 100, weight was 56 lb., and pulse rate was 160. The white blood count was 26,000 with a differential of 82 per cent polymorphonuclear neutrophil leukocytes and 18 per cent lymphocytes. The hemoglobin was 11 gm. The urine contained 1 plus of white blood cells and was otherwise normal. The admitting diagnoses were bacteremia, pneumonitis, rheumatic fever, and congenital heart disease. She was treated with oxygen, digitalis, penicillin, chlorauphenicol, and intravenous hydrocortisone. Twelve hours after admission, she seemed improved, but the nails became cyanotic and a grade III apical systolic murmur became audible. An electrocardiogram taken at this time disclosed a PR interval of 0.14 seconds, a QT interval of 0.28 seconds, and right ventricular hypertrophy. About one hour later, she suddenly expired. Postmortem examination showed rheumatic pneumonitis, rheumatic endocarditis, rheumatic myocarditis, and toxic congestion of the liver, spleen, and kidneys.

Case 2. C.B., a white male, was born May 10, 1939. At 5 prior clinic admissions, balanitis, stomatitis, cervical adenitis, enteritis, bronchitis, and eczema were diagnosed. On February 4, 1953, malaise, sore throat, and stuffy nose developed, which seemed to subside normally until February 10, when he complained of abdominal pain and began to vomit. His sixth clinic admission began February 11, 1953. Examination disclosed a well-nourished child who complained of pain in the right flank. His rectal temperature was 99, weight was 100 lb., and the pulse rate was 100. The skin was normal. There was no general glandular enlargement. The eyes and ears were normal. The throat was 1 plus inflamed. No heart murmurs were heard, and the lungs were clear. The abdomen was tender along the right flank, especially in the right lower quadrant, and, on rectal examination, the right side was more tender than the left. The genitalia and extremities were normal. The hemoglobin was 13 gm., and the white blood count was 17,900 with a differential of 92 per cent polymorphonuclear neutrophil leukocytes and 8 per cent lymphocytes. The urine showed 2 plus albumin and 5 white blood cells per high power field. An appendectomy was performed. The appendix showed polymorphonuclears scattered through the mucosa, submucosa, and muscularis and pronounced lymphoid hyperplasia. On February 13, a rectal tempera-

ture of 104 developed and a cough. The heart and lungs were clear. A chest roentgenogram showed a slight enlargement of the heart and a right upper lobar pneumonia. He was treated with penicillin and sulfadiazine. His throat culture revealed a staphylococcus and a diplococcus. On February 16, the temperature was normal, and he seemed much improved. His white blood count was 13,900 with 84 per cent polymorphonuclear neutrophil leukocytes and 16 per cent lymphocytes, and his urine was normal. His stitches were removed on February 18. On February 19, the temperature became elevated. A roentgenogram on February 20 showed that the chest was clear and that the heart was still slightly enlarged. His temperature continued on February 21, 22, and 23. On February 23, his white blood count was 22,300, and a blood culture was sterile. On February 24, the urine contained 1 plus bile. On February 25, he suddenly became cyanotic and nauseated, and abdominal distention developed. His heart tones became muffled, the rate rapid, and his respirations shallow. A chest roentgenogram showed a markedly enlarged heart, pericardial effusion, and left pleural effusion. An electrocardiogram showed a PR interval of 0.24 seconds. His blood pressure was 120/70. He was digitalized and started on cortisone. Within twenty-four hours, he was much improved. On February 27, his urine contained 4 plus bile, the direct serum bilirubin was 0.5-mg. per cent, and the indirect fraction was 1.0-mg. per cent. On March 1, 1953, a blowing, grade III apical systolic murmur was heard, and the temperature was normal. On March 4, a roentgenogram showed a slightly generally enlarged heart, which was greatly improved since the initial examination. On March 7, after he had received 1.5 gm. of cortisone, he became markedly depressed, would not cooperate or stay in bed, and became hysterical and overactive. Choreiform motions of his hands were noted. The cortisone was discontinued, and convalescence was uneventful. His chorea disappeared in May and has not recurred. He was last seen in July 1957. His blood, urine, sedimentation rate, and chest were entirely normal. The liver could not be felt. A grade I to II apical systolic murmur was audible. He is taking penicillin continuously for prophylaxis. This patient had rheumatic appendicitis, pneumonitis, hepatitis, acute rheumatic carditis, chorea, and residual mitral insufficiency.

SUMMARY AND CONCLUSIONS

The literature on rheumatic fever has been reviewed. Data concerning 135 children with acute rheumatic fever have been presented, and 2 illustrative case reports have been discussed.

Rheumatic fever should be ruled out whenever any systemic disease occurs in a child. Careful study and observation may reveal evidence of rheumatic fever in even the most obscure cases.

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TUBERCULOSIS STRIKES PEOPLE OF ALL AGES, but half of the cases reported are among people under 45 years of age. A new case is reported in the United States every six minutes. One-third of the nation — 55,000,000 Americans — are believed to be infected with the germs that cause tuberculosis. Of this number, an estimated 2,700,000 will develop tuberculosis if the present rate of development of disease from infection continues. The largest number of cases are found among men.

The annual cost of tuberculosis in the United States is approximately \$725,000,000, most of which is borne by the taxpayers. The cost of the disease to the American people has increased more than \$1,000,000 since 1952.

Dysfunctional Uterine Bleeding during Puberty

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DYSFUNCTIONAL UTERINE BLEEDING may be defined as abnormal and excessive bleeding which arises from physiologic disturbances rather than from pathologic processes. Hormonal dysfunction is the chief cause, but nutritional factors, vitamin deficiencies, psychogenic factors, and systemic disease play important primary or secondary roles. From a therapeutic viewpoint, however, even bleeding associated with pathologic lesions, such as endometrial polyps, pelvic inflammatory disease, endometriosis, and, to a great extent, fibromyomas of the uterus, need no longer be considered purely surgical problems, since bleeding in such instances may be brought temporarily under control in a manner similar to that employed in purely dysfunctional disturbances.

It has been pointed out that during the period of awakening ovarian function—puberty—or waning ovarian function—the climacteric—the incidence of dysfunctional bleeding tends to be greater. This paper is concerned with the problem of excessive bleeding during puberty.

ETIOLOGY

The mechanism involved in the awakening of pituitary-gonadal function is not completely understood. However, it has been postulated that either a central nervous system factor or the growth of the primordial follicles is responsible. Primordial follicle growth is accompanied by the release of estrogens from the supporting granulosa and theca cells surrounding the follicle. These estrogens probably stimulate the release of gonadotrophic hormones from the pituitary.

During puberty, the majority of menstrual

cycles are anovulatory. Usually a minimum of 10 to 15 menstrual cycles occur before ovulation is established because of the low irregular gonadotrophin titre characteristic of puberty. This is in contrast to the excessive irregular gonadotrophin production of the climacteric. It can easily be seen that any type of irregular gonadotrophic hormone production can lead to a disturbance of menstrual function.

DIFFERENTIAL DIAGNOSIS

Although pituitary-gonadal dysfunction must be considered the most probable cause of excessive bleeding during pubescence, it should not be forgotten that bleeding is only a symptom. The mere presence of this symptom does not indicate that it is due solely to hormonal imbalance. Table 1 lists the more common causes of excessive puberal bleeding.

TABLE 1
DIFFERENTIAL DIAGNOSIS

- | |
|-------------------------------------|
| 1. Pituitary-gonadal dysfunction |
| 2. Blood dyscrasias |
| 3. Nutritional or metabolic disease |
| 4. Systemic disease |
| 5. Pelvic pathology |

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Blood dyscrasias are a common cause of puberal menometrorrhagia. Among the diseases that may have dysfunctional uterine bleeding as a presenting symptom are leukemia, thrombocytopenic purpura, various disorders of the clotting mechanism, and anemias. Chronic diseases, whether of a nutritional, metabolic, or systemic nature, may affect the menstrual mechanism. Since, as noted, the majority of menses at puberty are anovulatory, the presence of a systemic disease further impedes the normal maturation of the menstrual mechanism.

Local pathologic conditions should also be considered among the possible causes of excessive bleeding at puberty. The more common of

these are vaginitis and trauma. Tumors occasionally occur in this age group and can have unusual bleeding as their presenting symptom.

DIAGNOSTIC AIDS

For the diagnosis of conditions occurring in the reproductive years and in later life, the various cytologic methods in common use are of great value to the physician. However, during adolescence, cytologic studies may not be so helpful. Table 2 lists in outline form a simple routine that may be followed in trying to arrive at a differential diagnosis of puberal bleeding.

TABLE 2
SUGGESTED WORK-UP

1. Complete history and physical
2. Hematologic studies
a. Complete blood count
b. Bleeding and clotting time
c. Platelet count
3. Vaginal smears for function
4. Protein blood iodine
5. Special studies

As in any problem confronting the physician, the first steps in diagnosis consist of obtaining an adequate history and performing a complete physical examination. A rectal examination should be done routinely. Occasionally, a vaginal examination may have to be performed. When this is necessary, it should be done in the hospital under anesthesia so that the greatest amount of information may be obtained.

An integral part of the work-up is a complete hematologic study. From this may be obtained not only knowledge regarding the cause of the bleeding but also a fairly concrete estimate of the actual blood loss which has taken place. In young Negro women, we also include a sickle-cell study.

The use of the vaginal smear to determine the estrogen effect gives the physician some idea of the amounts of estrogen being produced by the patient. The growth of the vaginal epithelium is controlled by the estrogens produced by the ovary. If a good estrogen effect is noted cytologically, it is a reflection of good ovarian function.

The evaluation of the blood protein iodine level is a satisfactory test for thyroid function during puberty. We do not advocate the routine use of radioactive iodine uptake studies during puberty. The basal metabolic rate is subject to many extrinsic pressures which may adversely

influence the results. When ordering a blood protein iodine determination, it is important to remember that the results will be influenced by the recent use of any iodized oils systemically for diagnostic purposes or the use of iodized pharmaceutical products.

Special studies, such as a twenty-four-hour urinalysis to determine the follicle-stimulating hormone level or 17 ketosteroid excretion level, diagnostic x-ray of the long bones for bone age, or sella turcica films, are reserved for problem cases. Other studies which may be necessary include a chest roentgenogram, glucose tolerance curve, and erythrocyte sedimentation rate.

MANAGEMENT

The handling of these problems should be directed toward control of the immediate bleeding episode and supportive care to place the patient in as physiologically normal a state as possible. We feel that although endocrine therapy may be used in many nonendocrine cases to quickly control the bleeding, it should not be continued unless there is a definite endocrine basis for the menstrual dysfunction.

The indiscriminate use of the sex steroids during adolescence may lead to permanent impairment of the pituitary-gonadal mechanism during the reproductive years. We have arbitrarily accepted 18 years as the upper limit of puberty. After this age, our approach to the management of excessive bleeding is different, for we are then dealing with problems of bleeding during the reproductive years.

Therapy of puberal bleeding is divided into 2 categories—supportive and specific. The supportive measures are outlined in table 3.

TABLE 3
SUPPORTIVE MEASURES

1. Nutritional
a. Iron
b. Vitamins
c. Proteins
2. Blood replacement
3. Reassurance

The nutritional problem should be handled with a multipronged approach. We prefer to use multivitamins in a dose containing twice the daily adult minimum requirements. There are many iron preparations available for the clinician to use. It is generally agreed that ferrous iron is all that is needed in the pure iron deficiency anemia. The problem with such therapy is gastrointestinal intolerance. Recently, we have had

satisfactory experience with an iron chelate which apparently has the advantages of being well tolerated, the maximum dosage required is low, and it is better absorbed.

Protein supplements are prescribed for these patients daily in the form of protein hydrolysates. In addition, they should receive a diet containing 2 gm. of protein per kilogram of body weight. It must be kept in mind that these patients are in a stage of growth and development, and their protein requirements are greater than an adult's. When whole blood is needed to overcome the problem of acute blood loss, transfusion and hospitalization, of course, are indicated. Intelligent reassurance to both the patient and the parent during the period of the uterine bleeding is necessary. Because of the anxiety associated with this type of bleeding, an intelligent and understanding physician will allay many of the family's fears and doubts.

Table 4 outlines the various groups of specific agents that are available for the treatment of puberal bleeding.

TABLE 4
SPECIFIC MEASURES

1. Steroid therapy
a. Estrogens
b. Estrogens and androgens
c. Estrogen—androgen—progesterone
2. Gonadotrophins
3. Aniline dyes
4. Dilation and curettage

Our method of choice consists of starting with steroid therapy and proceeding to the remainder of the specific agents in an orderly fashion. This program was designed primarily as a study method, so that intelligent observations could be made in order to evaluate its efficacy. However, if, in the course of work-up, a specific etiology is found, treatment is directed toward the correction of this factor. The therapeutic measures using an hormonal approach to therapy may be outlined as follows:

1. *Estrogens.*

- Orally: ethinyl estradiol, 1 mg. twice daily for twenty-one days.
- Intamuscularly: estradiol benzoate, 10,000 international units in sesame oil weekly for three weeks.
- Intravenously: Premarin, 20 mg. in 250 cc. of normal saline.

Anhydroxy progesterone is given to all patients on the fifteenth day of therapy in a dose of 25 mg. for ten days.

2. *Estrogen-androgen therapy.*

Estradiol benzoate, 5,000 international units and testosterone propionate, 50 mg. three times a week for two weeks.

3. *Estrogens-androgens-progesterone.*

1 cc. of the combined product for five days.

4. *Gonadotrophic hormones.*

Synapoidin, 0.5 cc. three times a week for three weeks.

5. *Aniline dyes.*

Toluidine blue supplied as Blutene, 100 mg. twice daily for one week.

6. *Dilation and curettage.*

When using any of the preparations described, one must be aware of the side effects of the drugs and their contraindications. Steroid therapy should never be used for more than 3 consecutive cycles because of the possibility of damaging the pituitary gonadal system. During puberty, we feel that controlling the immediate episode of bleeding is the important consideration. As it takes many cycles to arrive at the normal ovulatory mechanism during puberty, firing of this mechanism may not be necessary after the bleeding is controlled.

Excess uterine bleeding during puberty is not analogous to a similar situation during the reproductive years or at the climacteric. Gonadotrophic hormones are not recommended until the other therapeutic regimes have been tried and found wanting. Their use may be associated with side effects, such as sensitization to the protein, allergy, and antihormone formation. It is always a wise step to skin test the patient prior to using the gonadotrophic hormone.

Toluidine blue is of value in certain cases in which the clotting mechanism is impaired due to the presence of an increased protamine filtrable substance in the blood. The use of toluidine blue in most cases is a therapeutic test of the efficacy of this compound.

In a small percentage of cases, the clinician has to resort to dilation and curettage to control abnormal bleeding. This procedure should be undertaken in most cases only after all other avenues of therapy have failed. The possible psychic trauma from dilation and curettage in the young patient must be borne in mind.

CONCLUSIONS

In general, the physician's approach to the management of puberal bleeding should be based on sound physiologic principles. The possibility that excessive bleeding may be a manifestation of systemic disease must always be considered. When systemic disease exists, treatment of the primary disorder usually results in subsidence of

the bleeding. In treating these patients, the major aim is to control the bleeding episode and then allow the pituitary-gonadal mechanism to

develop by itself. Suggested regimes for the management of puberal bleeding have been presented.

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By applying TES-TAPE to the cervical mucus, the increase in glucose concentration that accompanies ovulation can be detected. The procedure, which the patient can do at home, enables the rhythm method to be practiced more easily than by calendar calculation or use of basal temperature charts.

A Tes-Tape impregnated with glucose oxidase is placed on the tip of a cardboard tampon and inserted into the vagina for five minutes. When glucose level is highest, the tape stains deep green.

After appearance of the deepest stain, coitus should be avoided for four days by patients who do not desire pregnancy.

JOSEPH B. DOYLE, M.D., Tufts University, Boston, and Boston College, J.A.M.A. 167:1464, 1958.

SEX CAN BE DETERMINED by noting a special mass of chromatin in the cell nuclei, the sex chromatin. It is regularly found in the nuclei of normal females but not of males.

Tests of chromosomal sex are particularly helpful in diagnosing suspected adrenocortical hyperplasia in female infants, gonadal dysgenesis in childhood, the testicular feminization syndrome during and after adolescence, and seminiferous tubule dysgenesis.

In determining the patient's appropriate sex, test results must be considered along with such features as the anatomy of the external genitals, available hormonal therapy, and the sex already assumed.

The oral mucosal smear is a reliable test for chromosomal sex and is simpler than either skin biopsy or neutrophil study. The buccal mucosa is scraped, transferred to an albuminized slide, fixed for thirty minutes in equal parts of 95 per cent alcohol and ether, and stained with thionine, cresyl violet, or other basic stains. Slight acid hydrolysis before staining sharpens the nuclear detail and eliminates bacterial staining. The sex chromatin is usually planoconvex or much flattened and adheres closely to the inner surface of the nuclear membrane.

JOHN C. RATHBUN, M.D., EARL R. PLUNKETT, M.D., and MURRAY L. BARR, M.D., University of Western Ontario, London. *Pediat. Clin. North America*, p. 375, May 1958.

WHO in an Era of Chemotherapy

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WHEN I WAS ASKED to speak before the eleventh annual World Health Assembly, I gladly accepted the invitation because of my deep respect for the ideals and the accomplishments of the World Health Organization. Any intelligent person will agree that the major challenge facing civilization today is the problem of how peace can be maintained throughout the world. Regardless of national boundaries, WHO has as its goal the elimination of sickness and the maintenance of good health among all people. Such aspirations promote happiness and friendship and lead to international harmony.

I have had the privilege of acting as a consultant for WHO since 1950, and I have traveled about in several countries as a representative of this organization. It has become quite obvious to me that much of WHO's success is due to the dedicated and hard working, permanent personnel of this group. I have been impressed by how much WHO has accomplished in the field of public health with such a modest budget. It also has been impressive to note the respect that people at all levels of life in the different countries have for WHO.

Although WHO has just had its tenth anniversary, it should be emphasized that the objectives of this organization did not spring up overnight. For many decades, attempts had been made among nations to curb the spread of pestilences, such as plague, smallpox, cholera, and typhus. Indeed, the Pan American Sanitary Bureau was established over half a century ago in an endeavor to control the spread of disease among the nations of the Western Hemisphere. Similar efforts had later occupied the attention of other organizations, such as the League of Nations, the International Red Cross, and the Rockefeller Foundation. Because the labors of all of these groups, including WHO, have been largely concerned with the control and eradication of in-

fectious diseases, I would like to discuss briefly the role that chemotherapy has played in this program.

ROLE OF CHEMOTHERAPY

Modern chemotherapy began in 1935 with the sulfonamides. For the first time, effective therapy rapidly became available for hemolytic streptococcal disease, pneumococcal infections, suppurative meningitis, and gonorrhea. The subsequent introduction of the sulfone compounds proved advantageous in the treatment of leprosy. By 1940, the attack on infectious diseases was widened through the application of Fleming's discovery of penicillin. Most gratifying to physicians all over the world was the sustained efficiency of penicillin against syphilis, yaws, and gonorrhea. In 1944, the monumental achievement of Waksman was made available to medicine in the form of streptomycin, which has proved so valuable in the therapy of tuberculosis. Other chemicals, such as isoniazid (INH) and para-aminosalicylic acid (PAS), reflected further advancements in the treatment of tuberculosis.

It is singularly remarkable that in the decade 1935 to 1945, which immediately preceded the founding of WHO, the greatest advancements in the history of mankind took place in the control and therapy of infectious diseases. And, many of these developments occurred at a time when civilization was gripped in the most terrifying of all wars! Not only did the sulfonamides, sulfones, and antibiotics appear during this period, but antimalarial compounds were made available, and insecticides, such as DDT, were brought into use for the prevention of malaria and epidemic typhus. What an appropriate time it was to launch an international health agency like WHO, so that these new discoveries could be made available to all the people in the world.

However, these advancements still left much to be desired. Effective therapy was still lacking for major diseases like typhoid fever and the rickettsial diseases, such as epidemic typhus, murine typhus, Rocky Mountain spotted fever, and Q fever. Furthermore, penicillin or streptomycin was most effective when injected parenterally

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with the aid of a needle and syringe. But, in many parts of the world, it was neither practical nor possible to administer drugs by injection. The really miraculous antimicrobial drug would possess a broad spectrum of antimicrobial activity and would be one that could be administered by mouth. Again, it is fortuitous that such a drug made its appearance during the first year of WHO's existence.

Early in 1948, Aureomycin was made available to our group at the University of Minnesota for investigations on human brucellosis. During the summer of that year, we treated with this new antibiotic a group of patients seriously ill with brucellosis in Mexico City in cooperation with Dr. M. Ruiz Castaneda. The beneficial results were much beyond our expectations. In similar fashion, other groups demonstrated that Aureomycin could be effectively administered orally to patients having a wide variety of infectious diseases. Additional broad-spectrum drugs soon appeared. Terramycin had therapeutic properties similar to Aureomycin. Chloramphenicol proved to be the most efficient agent for typhoid fever. Modifications of both Aureomycin and Terramycin have appeared on the market, especially in the form of the tetracycline group of drugs. However, it is my own belief that from a therapeutic point of view, Aureomycin yields just as favorable results today as the more recently introduced tetracyclines. As far as we are concerned, no other drug has surpassed the therapeutic efficiency of Aureomycin in the treatment of human brucellosis. For more severe cases, we do recommend a combination of streptomycin and Aureomycin—or tetracycline. While other antibiotics became available during the decade 1948 to 1958, their use is much more restricted because they have a narrower range of antimicrobial activity.

The sulfonamides, penicillin, streptomycin, broad-spectrum antibiotics, insecticides, and anti-malarial agents all reflect tremendous advancement in the control and therapy of infectious diseases. Never before in the history of mankind have the advancements been so rapid in the management of infectious diseases as in the last two decades. This, indeed, has been a golden era of therapy. These advancements, however, have created some new problems for man—and I would say for WHO—and it is well to take brief inventory of these problems at this time.

PROBLEMS INDUCED BY ACHIEVEMENTS

No infectious disease has ever been treated out of existence. I don't know of a single strain of

gonococcus or of *Treponema pallidum* that has become resistant to penicillin, and yet gonorrhea and syphilis have not been wiped out. I have been told that primary cases of syphilis have actually increased recently in some areas in the United States. Persistent vigilance along the lines of well-established public health measures is essential in controlling and eliminating these diseases. Neglect of water and milk supplies in metropolitan areas like Minneapolis or New York could bring about frightful epidemics within a short time. The pestilences of cholera, plague, smallpox, and typhus are still serious threats in many parts of the world. Children still die of tetanus in Minnesota. Rabies continues as a menace to both animals and man. These are some of the reasons why WHO should continue to spread the sound doctrines of public health.

Ever since Paul Erlich first applied his brilliant concept of chemotherapy to the infectious diseases over fifty years ago, considerable apprehension has existed concerning the possibility that microbes would develop resistance to the lethal action of the chemicals. We have learned that this apprehension is not without some foundation. As a result of contact with DDT, strains of mosquitoes and flies have appeared that are resistant to this insecticide. After the large-scale use of the sulfonamides in the treatment of gonorrhea, a majority of the cultures of gonococci in some areas were found to be resistant to these drugs. A considerable proportion of strains of tubercle bacilli became resistant to streptomycin following the use of this antibiotic in the treatment of tuberculosis. One of the most serious threats to human health today is the appearance of antibiotic-resistant strains of staphylococci in our large medical centers. The problem of acquired infections in our general hospitals due to resistant strains of staphylococci is quite serious, and I fear that this problem will engage our attention for a long time. However, in spite of the appearance of antibiotic-resistant microbes as a result of the extensive use of these drugs, it is more remarkable that many species of microorganisms are still highly sensitive to the killing effect of these agents. Penicillin has been used extensively the world over, and yet I am not aware of a single strain of group A hemolytic streptococcus, pneumococcus, gonococcus, or *Treponema pallidum* that has become significantly resistant to this antibiotic.

There is no question that the modern use of antibiotics represents one of the greatest advancements in medical history. But, progress always stirs up new problems, and the control of

infectious diseases is no exception. I would like to conclude by citing one or two socioeconomic problems that have been induced in part by this advancement.

SOCIOECONOMIC CHALLENGE

The older clinicians used to state that bronchopneumonia was the old man's friend. Instead of lingering on with degenerative diseases that caused intellectual and physical deterioration, the aged person quietly slipped out of this world after a brief attack of pneumonia. However, now the antibiotics are prolonging life and bringing with it the critical problem of caring for the aged. On frequent occasions, many of us in hospitals do not examine anyone under 70 years of age. As life is prolonged through the control of disease and with better nutrition, the problem of caring for a population of advanced years will become more and more critical.

But, the control of infectious diseases has far greater socioeconomic connotations than pro-

longing the years of persons of advanced age. Infant and maternal mortality have also been reduced considerably. Let us also consider the lives that have been saved through the control of malaria alone or as a result of lowering the mortality rate of tuberculosis. If we eliminate infectious diseases, if we provide better food and shelter for large segments of the world, if we abolish war, the population of the world will increase at a tremendous rate, and this era may not be too far away. When I hear about the extraordinary sums of money that are being devoted to the exploration of the stellar spaces and the possibilities of landing on the moon, I wonder if a little more effort and money should not be devoted to the problems of space in our own world. Better health means more people living longer and on a higher socioeconomic level. I am certain that in the not too distant future, WHO delegates will be contesting with problems that we have brought about through our accomplishments.

ACCORDING TO THE HEALTH INFORMATION FOUNDATION, the average person today sees his doctor about five times a year, almost twice as often as did his counterpart thirty years ago. In the aggregate, Americans pay physicians between 800 and 850 million visits a year.

Women see physicians more often than men do, especially between the ages of 15 through 44. During childhood, however, boys receive more medical care than girls.

Persons in low-income groups now see a physician almost as often as those in high-income groups, says Health Information Foundation. Thirty years ago, by contrast, high-income families averaged about half again as many visits to doctors as did those with the low incomes.

Years of Progress in Venereal Disease Control

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CONSIDERABLE PROGRESS has been made in venereal disease control in the continental United States. As seen in table 1, the highest rates for total, early latent, late and late latent syphilis were in 1943, for primary and secondary syphilis and gonorrhea in 1947. The decline in reported total syphilis was continuous from 1947 to 1956 when the first rise occurred.¹ Success in control is due to constant vigilance; proper use of penicillin; availability of adequate case finding, diagnostic, and treatment facilities; availability of trained personnel; and general interest in controlling a disease which, if untreated, could result in blindness, heart disease, paralysis, mental disorders, or death. Such vigilance and proper surveillance must continue if the lowest attainable levels are to be reached.

There is an increasing number of publications which present evidence that vigilance has been overrelaxed.²⁻⁹ The decrease in vigilance may be a result of misinterpretations of current venereal disease statistics. Many of the reported evaluations of these statistics are based upon data relating to the nation's problem as a whole rather than the problems in specific local areas.

Despite the progressive decline in gonorrhea and in all stages of syphilis to 1956, some important points should be considered. The rate for total syphilis in 1956 for nonwhites is practically as high as the highest rate ever recorded in the United States for the total population (1956 nonwhite — 437.9 per 100,000, 1943 total population — 447.0 per 100,000).¹ The ratio of early latent and late and late latent syphilis to primary and secondary syphilis has increased materially since 1947. This means that the proportion of failures in early case finding has increased.

In 1932, Dr. Thomas Parran,¹⁰ who launched

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This paper is dedicated to Professor Joseph Tomesik, of the University of Basel, on the occasion of his birthday.

America's greatest offensive against venereal disease, stated, "Syphilis can never be controlled while more than one-half of the cases are not recognized for more than one year after onset." In 1947, in the United States, the ratio of reported cases of early latent syphilis of four years' duration or less to cases of primary and secondary syphilis was about 1:1. In 1957, the ratio was over 3:1. In regard to late and late latent syphilis, the ratio of late and late latent cases found to primary and secondary syphilis was slightly over 1:1 in 1947. In 1957, the ratio was 16:1. Every case of early or late latent and late syphilis represents a failure of previous case finding. For the past four years, primary and secondary syphilis has been reported at an average of 6.5 thousand cases per year. Over the same period of time, the number of reported cases of early latent syphilis has averaged 21.7 thousand cases per year. Thus, for every case of primary and secondary syphilis found during this four-year period, at least 3 similar cases were not found. Those discovered were found after they had passed through the infectious period. This means not only that more cases were missed than were found, but also that those missed were potential hazards to others during the primary and secondary stages and possible infectious relapse periods.

The Oslo study of untreated syphilis^{11,12} indicates the potential hazards of untreated primary and secondary syphilis. Approximately 25 per cent of the untreated patients had infectious relapses within the first four years after infection. Of these, 22 per cent had more than 1 recurrence of infectious lesions. Of the untreated syphilitics, 15.8 per cent developed benign late lesions, 9.4 per cent of men and 5.0 per cent of women developed neurosyphilis, 13.6 per cent of men and 7.6 per cent of women had cardiovascular syphilis, and syphilis was the chief cause of death in 10.8 per cent. Thus, failure to discover and treat syphilis during the primary and secondary stages adds considerable hazards to health.

Late symptomatic syphilis is prevented by the adequate treatment of discovered latent syphilis.

TABLE 1
CASES OF SYPHILIS AND GONORRHEA AND RATES PER 100,000 POPULATION
REPORTED BY STATE HEALTH DEPARTMENTS
FISCAL YEARS 1941-1957¹

Fiscal year	Total syphilis*		Primary and secondary syphilis		Early latent syphilis		Late and late latent syphilis		Gonorrhea	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
1941	485,560	368.2	68,231	51.7	109,018	82.7	202,984	153.9	193,168	146.7
1942	479,601	363.4	75,312	57.1	116,245	88.0	202,064	153.1	212,103	160.9
1943	575,563	447.0†	82,204	63.8	149,390	116.0†	251,958	195.7†	275,070	213.6
1944	467,641	367.8	78,418	61.7	123,019	96.7	202,780	159.5	300,585	236.4
1945	359,115	282.3	77,007	60.5	101,719	80.0	142,188	111.8	287,181	225.8
1946	363,647	271.7	94,957	70.9	107,924	80.7	125,248	93.6	368,020	275.0
1947	372,963	264.6	106,539	75.6†	107,767	76.4	121,980	86.5	400,639	284.2†
1948	338,141	234.7	80,528	55.9	97,745	67.8	123,972	86.1	363,014	251.9
1949	288,736	197.3	54,248	37.1	84,331	57.6	121,931	83.3	331,661	226.6
1950	229,736	154.2	32,148	21.6	64,786	43.5	112,424	75.5	303,992	204.0
1951	198,640	131.8	18,211	12.1	52,309	34.7	107,133	71.1	270,459	179.5
1952	168,734	110.8	11,991	7.9	38,365	25.2	101,920	66.9	245,633	161.5
1953	156,099	100.8	9,551	6.2	32,287	20.8	100,195	64.7	243,857	157.4
1954	137,876	87.5	7,688	4.9	24,999	15.8	93,601	59.4	239,661	152.0
1955	122,075	76.0	6,516	4.1	21,553	13.4	84,741	52.7	239,787	149.2
1956	126,219	77.1	6,757	4.1	20,014	12.3	89,851	54.8	233,333	143.9
1957	135,542	82.3	6,283	3.8	20,346	12.2	100,514	60.8	216,476	129.7

*Includes "stages of syphilis not stated"

†Highest rates

Source: Venereal Disease Fact Sheets¹

but the numerous cases of late syphilis discovered annually indicates that all latent syphilis is not discovered in time to prevent late complications.

Today's venereal disease problems have been studied by means of a questionnaire sent to all states and territories, all cities in the United States with populations over 100,000, and to the District of Columbia. Replies were received from 48 states, 3 territories, 95 out of 107 cities, and the District of Columbia. The results are presented in the fifth annual Joint Statement, *Today's Venereal Disease Control Problem*, recently released by the Association of State and Territorial Health Officers, the American Venereal Disease Association, and the American Social Hygiene Association.¹³

Table 2 shows the number of states and cities reporting increases in syphilis rates during the five-year period of these annual studies.¹³ Although there have been rises in the total number of reported cases of syphilis in all stages in from 9 to 23 states annually since 1953, this was not reflected in rates for the United States as a whole until 1956 and 1957 (table 1). In 1957, 135,542 cases of syphilis were reported as compared with 126,219 in 1956 and 122,075 in 1955. The greatest change in the number of reported cases of syphilis during 1957 is the increase of 10,663 cases of late and late latent syphilis, bringing the total to 100,514 cases with a rate of 60.8 per 100,000 population. This is the highest number of late and late latent cases reported in the United States since 1952. Twenty-six states and

25 cities showed increases in the rates of reported late and late latent syphilis for 1957.

In 1957, primary and secondary syphilis declined slightly in the United States as a whole but rose in 25 cities and 20 states. Early latent syphilis rose slightly in the United States as a whole but increased in 19 cities and 21 states.

Since 1953, the number of states reporting increases in gonorrhea over previous years has varied from 15 to 27 annually. In 1957, 18 states showed increases over 1956 in the number of reported cases. Despite these local rises, the total number, or 216,476 cases, in the United States as a whole declined by 16,857 cases.

Health officials generally agreed that fluctuations in the number of reported cases are due to variations in the use of case-finding measures and the extent to which state and local health departments use well-known measures for control. An increase in case-finding activity almost invariably results in more cases being discovered and reported and subsequently increasing rates of reported cases.

Twenty states, 1 territory, and 17 cities reported outbreaks of venereal disease in 1957. An outbreak is a cluster of cases which, by epidemiologic investigation, have a common source and occur within a relatively short period of time. The number of persons involved in these outbreaks ranged from 45 to 326. The number of newly discovered cases of infectious syphilis in these outbreaks ranged from 9 to 72.

Fourteen states and 19 cities reported a rise

TABLE 2
NUMBER STATES AND CITIES REPORTING INCREASE IN SYPHILIS RATES
OVER PREVIOUS YEARS¹³

Fiscal year	Total syphilis		Primary and secondary syphilis		Early latent syphilis		Late and late latent syphilis	
	States	Cities	States	Cities	States	Cities	States	Cities
1953	15†	15	8†	11	6†	16	21†	17
1954	9†	14	10†	11	5†	14	15†	19
1955	16†	19	16†	20	11†	17	21†	20
1956	23°	24	20	25	18†	21	24°	23
1957	21°	22	20†	25	21†	19	26°	25

°Rates for nation increased this year (see table 1)

†Rates for nation decreased this year (see table 1)

Source: Today's Venereal Disease Control Problems, February, 1958.¹³

in venereal disease among the group 11 to 19 years of age, the increases ranging from 3 to 30 per cent over the previous year.

Continued successful prevention and control of venereal disease will depend upon the availability of necessary control facilities, control procedures, and trained personnel.

Sixteen states, 1 territory, and 5 cities declared that they do not have sufficient diagnostic and treatment facilities to meet current needs. Twenty-three states and 37 cities stated that reporting was not sufficiently complete to provide a reliable index of actual incidence and prevalence. A number of states and cities utilized serologic testing in selected areas to check on reporting. Others used routine laboratory reports and premarital blood testing data as checks on actual reports from private physicians and clinics. Wide discrepancies were noted.

Eight states and 6 cities are not able to provide adequate contact investigation for primary and secondary syphilis, and 21 states and 14 cities cannot provide this measure for early latent syphilis.

Twenty-one states and 14 cities believed that without additional federal support there would be insufficient funds for an effective local venereal disease control program in the coming year.

The largest problem encountered by the health officers is a shortage of personnel to maintain adequate control. Thirty-two states, 1 territory, and 9 cities reported inadequate coverage of 137 areas in which 20 million persons reside. Shortages of specific professional personnel were reported by 28 states, 2 territories, and 12 cities. In order to maintain surveillance and to achieve adequate control coverage, they indicated the additional immediate need of 35 trained physicians, 53 trained nurses, 87 contact investigators, 6 laboratory technicians, 15 record analysts, and 27 health educators.

No one will deny that much progress has been made in venereal disease control, but basic epidemiologic facts from various parts of the United States reveal that the problem is still one of considerable public health importance and may become more important if vigilance is relaxed.

"The etiologic agents of gonorrhea and syphilis are available in every state. There is no immunization, nor are there non-human vectors to control through environmental sanitation. Furthermore, promiscuity is common, particularly at early ages and among certain population groups. Constant active surveillance is therefore essential for prevention, control, and reduction to the lowest attainable level."⁸

Copies of the annual report: *Today's Venereal Disease Control Problem* are available each year from the American Social Hygiene Association, 1790 Broadway, New York City.

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Clinical Evaluation of Methocarbamol (Robaxin) in an Industrial Facility

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SOME OF THE COMPLAINTS most frequently encountered in industrial medical practice involve skeletal muscle spasm. In treating these patients, the industrial physician is faced with a dual challenge. First, he must attempt to provide sufficient relief so that the worker can return to his job in a full or limited capacity. Second, he must be sure that the worker can perform his duties in a safe manner; for, surely, we are not practicing good industrial medicine if we relieve symptoms and, at the same time, induce side effects that might render the worker vulnerable to accident or injury.

Although this problem has long plagued industry, no regimen of therapy has been devised to provide uniformly satisfactory results. Several muscle relaxant agents have been employed with varying degrees of success, both alone and in combination with other drugs and physiotherapy. For years mephenesin enjoyed popularity as a drug of choice. It showed promise initially and had many attributes recommending it as a good skeletal muscle relaxant. It did, in many cases, effectively diminish muscle spasm but with one drawback—for maximal effect, the drug had to be administered intravenously and, at most, only a brief and transient remission of symptoms was achieved. However, this was a successful beginning and proved that the rationale was sound. Then, in 1956, zoxazolamine, a compound chemically unrelated to mephenesin, became available. For a period, zoxazolamine enjoyed the spotlight as a popular muscle relaxant.

In the fall of 1957, the latest entry into this field, methocarbamol (Robaxin), was introduced. Pharmacologic evidence reported by Morgan and associates¹ described the extended activity of this new agent as compared to mephenesin.

Several recent clinical reports on the use of Robaxin in a variety of skeletal muscle disorders²⁻⁵ have described the efficacy, safety, and therapeutic scope of this drug. This report pre-

sents our observations on the results obtained with this skeletal muscle relaxant in 60 industrial workers.

PLAN OF STUDY

All patients were drawn from the 2,500 workers of a chemical and paper manufacturing industry. These individuals encompassed a good cross section of the employee population, including both sexes as well as all age groups. However, care was taken to include in this study only workers who, on their initial examination, were considered to have uncomplicated skeletal muscle spasm. Roentgenograms were taken in all questionable cases to exclude bone or joint pathology. All individuals with known chronic disease were easily eliminated, since the author was familiar with each worker's medical background. According to their situation, different varieties of acute skeletal muscle spasm are distinguished and are represented in this report.

The minimal dose of Robaxin necessary for a satisfactory response in this study was found to be 1 gm. (2 tablets) every four hours. Smaller doses did not produce the desired results. Much larger doses have been used by other investigators^{3,4} with an enhanced therapeutic response and a minimum incidence of side effects.

RATING OF RESPONSE TO THERAPY

The response to therapy was rated as follows:

Excellent—complete relief of symptoms within one hour and the ability to return to full duty.

Good—moderate relief of symptoms with the ability to return to work in a restricted capacity.

Fair—slight improvement of symptoms and the ability to return to light duty at the beginning of next shift without loss of time, thus preventing a lost time type of injury.

None—no relief of symptoms and inability to return to light duty after twenty-four hours.

RESULTS

The area of skeletal muscle involvement and the response to Robaxin therapy is outlined in table 1. It should be emphasized that this response not

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TABLE 1
RESPONSE TO METHOCARBAMOL THERAPY

<i>Muscles Affected</i>	<i>Excellent</i>	<i>Good</i>	<i>Fair</i>	<i>None</i>
Neck	0	1	1	0
Shoulder	0	7	1	1
Thorax	0	3	0	0
Lumbar region	6	21	2	3
Upper extremity	0	5	1	0
Lower extremity	1	6	0	1
Total	7 (12%)	43 (72%)	5 (8%)	5 (8%)

only includes relief of symptoms but also the worker's ability to return to his job. In these terms of reference, 92 per cent of the group were benefited by Robaxin. This included 7 patients, or 12 per cent, who were completely relieved of symptoms within one hour and were able to return to full duty. In addition, 43 individuals had a good response. They derived moderate relief of symptoms and could return to work in a restricted capacity. Response was fair in 5 patients, or 8 per cent of the group. Their symptoms slightly improved, and they were able to return to light duty at the beginning of the next shift without loss of time. Only 5 persons out of 60, or 8 per cent, did not experience any benefit from the medication.

Probably, in an industrial facility, the side effects produced by a drug are as important as the beneficial results obtained. This is a real consideration when employees are active around industrial equipment and injuries due to lack of concentration or awareness can be frequent. It was, therefore, interesting to note that no side effects were observed in any of these patients.

DISCUSSION

The symptoms of muscle spasm may come on suddenly or gradually, but they usually consist of pain on movement and tenderness on pressure. Sometimes the spasm is the result of voluntary guarding processes brought into play as a means of preventing any movement for fear of producing pain. Usually, the symptoms are confined to one muscle or a group of muscles.

The patient may have a spasm in the lumbar region, which most frequently involves the apon-

euoses of the erector spinae and latissimus dorsi. The pain is often intense and it may markedly affect locomotion. In many instances, the onset of pain can be traced to some physical exertion. Another type involves the thorax in which the sheaths of the pectoral muscles, intercostals, or serratus magnus are more commonly affected. A stiff neck involves the cervical muscles, especially the sternocleidomastoid. Again, the condition may be the shoulder syndrome or the "charley-horse" of the lower extremities. Whatever the cause or wherever the involvement, the patient seems to think that there should be a simple remedy for such a simple symptom complex. Unfortunately, this is seldom the case. Those overstretched and injured muscle fibers prove extremely resistant to therapy.

Since the primary concern of the industrial physician is the physical well-being of the worker in relation to his duties, our results indicate that Robaxin is indeed a worthwhile addition to the therapeutic armamentarium.

SUMMARY

A group of 60 industrial workers, each with uncomplicated skeletal muscle spasm of sufficient severity to affect their ability to perform their duties, were treated with methocarbamol.

Results were gratifying in that 55 workers, or 92 per cent, could return to full or light duty.

No side effects were encountered.

CONCLUSION

In this study, methocarbamol (Robaxin) was found effective in reducing skeletal muscle spasm without side effects, and it is a safe drug, which the industrial physician may use with confidence.

Methocarbamol (Robaxin) was supplied for this study by A. H. Robins Co., Inc., Richmond, Virginia.

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Fig. 1. Roentgenogram showing stricture when first seen.

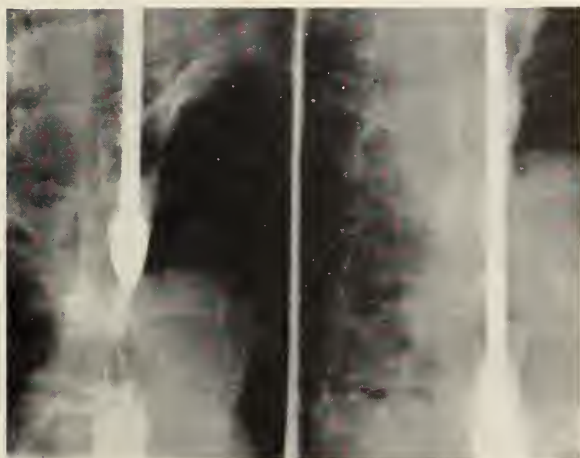


Fig. 2. Bougie shown approaching stricture and passing through it.

Stricture of Esophagus Due to Accidental Ingestion of Clintest Tablet

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REVIEW OF MEDICAL LITERATURE reveals 4 cases of esophageal stricture caused by ingestion of Clintest urine-testing tablets used by diabetic patients.

The first case reported by Bloomer and Kirchner¹ involved a 14-year-old white diabetic girl who was treated by esophagoscopy and dilation. This was followed by mediastinitis, after which external operation was performed with segmental resection of the stenosed portion of the esophagus. Dilation was used following the surgery.

The next report² by Lasky is that of a 64-year-old diabetic woman who was treated by esophagoscopy and repeated dilations over a swallowed silk thread.

In 1957, Canby's report³ involved a 3-year-old child and a 23-month-old child. The treatment is not described.

CASE REPORT

Mrs. O. M. C., a doctor's widow, aged 60, was seen on March 8, 1955, complaining of inability to swallow even liquids. History revealed that she had accidentally ingested a Clintest tablet mistaking it for a Caroid tablet. She immediately used the antidotes recommended — fruit

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juice, Wesson oil, and olive oil — which induced vomiting. Following this, a burning sensation was experienced in the epigastrium, which was the first pain noted. Dysphagia and choking were experienced the next day but no further burning or pain.

Increasing dysphagia was noted on the following nine days, at which time the patient was seen at the clinic. Barium swallow (figure 1) on March 8, 1955, showed a markedly narrowed segment 4 to 5 cm. in length at the junction of the upper and middle third of the esophagus. Obstruction was not complete, and thin barium passed readily. No other narrowed segments were demonstrated. The stomach and duodenal cap were normal. Two days later in the office, a 7 mm. Sippy dilating olive bougie on flexible coiled wire pusher was passed under fluoroscopy (figure 2) after Pontocaine anesthesia had been administered by spray and gargle to the pharynx. Dilation was carried out nine times during the next three months, gradually increasing the size of the olive dilator to 15 mm.

The patient has remained symptom-free since that time, and, when last seen in December 1957, barium swallow (figure 3) revealed a slight residual narrowing which does not cause any difficulty.

COMMENT

Esophagoscopy or passing a bougie over a thread, which are added safeguards in this type of case, were not done because of the relative ease with which the dilators passed under fluoroscopic view and also because of the patient's fine cooperation.

SUMMARY

The clinical course of a case of esophageal stricture produced by an innocent appearing caustic tablet has been described. Although these bottles are adequately labeled "poison," it would seem desirable to keep them away from any other medication which is taken orally. Diabetic patients should be warned of the danger involved when these tablets are misused.

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Fig. 3. Roentgenogram two years after ingestion of Clinitest tablet. Residual narrowing at the site of the former stricture is shown.

This department of THE JOURNAL-LANCET is devoted to reports on cases in which all the appropriate diagnostic criteria have been employed, the best known treatment administered and the results recorded. It is desired that these case reports be so prepared that they may be read with profit by physicians in general practice, hospital residents and interns and may be of considerable value to junior and senior students of medicine. This department welcomes such reports from individuals or groups of physicians who have suitable cases which they desire to present.

Leo G. Rigler, M.D.

H. MILTON BERG, M.D., and
HAROLD O. PETERSON, M.D.



DR. LEO G. RIGLER, the new president of the Radiological Society of North America, has long been known internationally as a radiologist, teacher, and clinician. Although his contributions to medicine and radiology are legion, he will be best remembered by his students for his extraordinary ability and tireless enthusiasm as a teacher. Perhaps because of his background in general practice and early training in internal medicine and pathology, but more likely because he is Leo Rigler, he possesses an unusual faculty for correlating the roentgen findings with the clinical signs and pathology. Drawing from a vast storehouse of general medical knowledge, he approaches diagnostic problems in an analytical and logical manner and almost invariably arrives at the correct diagnosis. In addition, he has a remarkable facility for interpreting radiology to medical students and to all other physicians, which has done much to give roentgen diagnosis its proper stature in medicine.

Dr. Leo G. Rigler was born in Minneapolis on October 16, 1896. He obtained his early education in the public schools in Minneapolis and entered the University of Minnesota, where he obtained his academic and medical training, receiving his M.D. degree in 1920. While serving his internship in the St. Louis City Hospital, he came in contact with the stimulating work then being done by Dr. LeRoy Sante. This made a great impression on the young intern and kindled his interest in radiology.

After completing his internship in 1921, Dr. Rigler set up general practice in the small community of New England, North Dakota. He bought an x-ray machine and taught himself its use. He soon realized that he would not be happy in general practice and returned to the University of Minnesota as

a resident in internal medicine and pathology in 1922. During his residency, it was noted that his major interest was in radiology and, fortunately for that specialty, he was soon given the opportunity to concentrate his training in that department. He has remained in radiology ever since. The latter part of the year 1924 was spent with Dr. J. T. Case at the Battle Creek Sanitarium and Dr. P. J. Hickey at the University of Michigan.

Dr. Rigler went to Sweden in 1926 and spent the greater part of the year with Dr. Gösta Forssell at the Caroline Institute in Stockholm. He became very proficient in Swedish during that year. After completion of his work with Dr. Forssell, he spent some months visiting other European clinics.

Upon his return from Europe in 1927, Dr. Rigler was appointed associate professor of radiology at the University of Minnesota and, in 1929, became full professor. In 1935, he was made head of the Department of Radiology, a position which he held until his recent resignation in June 1957. He was also chief of the Department of Radiology at the Minneapolis General Hospital from 1927 to 1957. During this same period, he was a radiological consultant to several hospitals in Minneapolis. From 1925 to 1936, he maintained a private office in downtown Minneapolis with Dr. Walter H. Ude.

The University of Minnesota erected a special and unique building in 1936 known as "The Center for Continuation Study" to be devoted to postgraduate education. In 1937, Dr. Rigler established there an annual one-week course in postgraduate radiology. Many famous American and foreign radiologists have participated in the presentation of these courses and the attendance has risen steadily, being well over 300 in 1957.

Dr. Rigler served as senior consultant at the Veterans Administration Hospital in Minneapolis and is a consultant for the Tuberculosis Division of the

United States Public Health Service and the Armed Forces Institute of Pathology. He is a member of the National Advisory Cancer Council, the Committee on Radiology of the National Research Council, the Lung Cancer Research Committee of the American Cancer Society, and a trustee of the American Board of Radiology.

Dr. Rigler is a member or honorary member of many American radiological and medical societies and has held the following offices: first president of the Minnesota Radiological Society; president of the Minnesota Pathological Society; chancellor of the American College of Radiology; chairman of the Section of Radiology of the American Medical Association; trustee of the American Registry of X-Ray Technicians, representing the Radiological Society of North America; and first vice-president of the Radiological Society of North America. He is a fellow of the American College of Radiology and the American College of Chest Physicians. He is an honorary member of 9 foreign radiological and chest societies. He is an associate editor of *Radiology*, assistant editor of *Diseases of the Chest*, and on the editorial board of *Surgery and General Practice*.

He was sent to Japan as a consultant with the medical mission of the United States Army in 1950. As a member of the visiting team of scientists of the World Health Organization and Unitarian Service Committee, he visited Israel and Iran in 1951 and India in 1953.

He has given the following honorary lectures: Carman Lecture at the St. Louis County Medical Society; Pancoast Lecture in Philadelphia; Hickey Lecture in Detroit; Golden Lecture in New York; Radiology Lecture of the Canadian Medical Association; and the Crookshank Lecture in London. He was the Caldwell Lecturer of the American Roentgen Ray Society in October 1958.

He has received the bronze medal of the American Medical Association, the silver medal of the Southern Minnesota Medical Association, the gold medal of the Radiological Society of North America, and the Crookshank palladium medal of the Faculty of Radiologists of Great Britain.

Dr. Rigler has edited or written three books. He has been the author or co-author of almost 200 papers. Some of the more important and original articles have dealt with the following: the early diagnosis and movement of pleural effusions; use of the visualized esophagus in the diagnosis of heart disease; roentgen visualization of the liver and spleen

with thorium dioxide sol.; the early diagnosis, the duration, and evolution of carcinoma of the lung; the latent period in the roentgen diagnosis of pulmonary tuberculosis; the roentgenological manifestations of pulmonary edema; the early diagnosis of carcinoma of the stomach; pernicious anemia and tumors of the stomach; benign gastric tumors; and acute abdominal conditions and intestinal obstruction.

In 1943, Dr. Walter H. Ude, with the assistance of Dr. Rigler's former students and his many friends, established an annual Rigler lectureship at the University of Minnesota. The Rigler Lecture is usually given at the time of the Continuation Course in Radiology and has been presented by outstanding radiologists in this country and abroad. This is one of the few lectureships established in honor of someone in his prime and indicates the high position Dr. Rigler holds in the eyes of his colleagues. Dr. Fred Jenner Hodges, professor of radiology at the University of Michigan and long time friend of Dr. Rigler, presented the first Rigler Lecture. Dr. Rigler was further honored in 1952, when his friends and former students arranged to present him with an oil painting of himself.

In 1920, Dr. Rigler was married to Matyl Sprung, a college classmate. They have three children—Ruth, Nancy, and Stanley or "Jack." Ruth is a writer and a story analyst. Nancy Rigler Saxon is married to a resident in surgery at the University of Minnesota, and they have three children. Dr. "Jack" Rigler is a resident in surgery at the University of Chicago. Matyl Rigler has always held open house whenever a visiting radiologist was in Minneapolis. She is a charming and gracious hostess, and many radiologists from all parts of the world have enjoyed the Rigler hospitality.

In 1957, Dr. Rigler resigned his professorship at the University of Minnesota and moved to Los Angeles. This was perhaps the most difficult decision of his career. He continues to be more active than most young men in radiology in his capacity as consultant and director of education in the Department of Radiology at the Cedars of Lebanon Hospital, Los Angeles, and visiting professor of radiology at the University of California, Los Angeles, in addition to his many duties with national societies and world-wide lecture commitments.

The Radiological Society of North America not only honored Dr. Leo G. Rigler but honored itself in electing him its president.

INDEX TO VOLUME 78

January 1958 through December 1958

SUBJECT INDEX

- AGED, outlook of vascular surgery upon, 329
Androgen-estrogen preparation, oral, suppression of lactation with, 491
Anesthesiologist's approach to prevention of operating room deaths, 64
Angina pectoris treated by relaxation and automatic attentive respiration, 7
Arthritides, drug synergism in the management of, 185
Asthma,
 eczema, and allergic rhinitis in infancy and childhood, 373
 medicinal treatment of, 105

BLEEDING, rectal, in infants and children, 86
Book Reviews,
 Anatomies of Pain (K. D. Keele), 33
 Anatomist at Large (G. W. Corner), Dec. 26A
 Ankylosing Spondylitis (J. Forestier, F. Jaqueline, and J. Rotes-Querol), 286
 Atomic Age and Our Biological Future, The (H. V. Bronsted), 368
 Atomic Energy in Medicine (K. E. Hanan), 112
 Bedside Diagnosis (C. Seward), 112
 Bone Tumors (D. C. Dahlin), Dec. 26A
 Brain Mechanisms and Drug Action (W. S. Fields), June 40A
 Chronically Ill, The (J. Fox), March 26A
 Clinical Gastroenterology (E. D. Palmer), 149
 Clinical Pathology Data (C. J. Dickinson), 112
 Conquest of Bovine Tuberculosis in United States (H. R. Smith), 424
 Dermatologic Formulary (F. Pascher), May 24A
 Dermatologist's Handbook, The (A. L. Welsh), 416
 Diagnosis and Treatment of Endocrine Disorders in Childhood and Adolescence (L. Wilkins), Jan. 24A
 Diagnosis and Treatment of Postural Defects, The (W. M. Phelps, R. J. H. Kiphuth, and C. W. Goff), 454
 Diseases of the External Ear (B. H. Senturia), 286
 Doctors and What They Do (H. Coy), May 26A
 Early Diagnosis and Treatment of Acoustic Nerve Tumors, The (J. L. Pool and A. A. Pava), 150
 Etiologic Factors in Renal Lithiasis (A. J. Bunt), 112
 Fundamentals of Clinical Neurophysiology (P. O. Chatfield), 149
 Gynecologic and Obstetric Pathology (Emil Novak and Edmund Novak), 500
 High Arterial Pressure (F. H. Smirk), 368
 History of Public Health, A (G. Rosen), 416
 Human Blood Coagulation and Its Disorders (R. Biggs and R. G. MacFarlane), July 22A
 Human Ear Canal, The (E. T. Perry), Aug. 18A
 Human Perspiration (Y. Kuno), 368
 Hypertension (I. H. Page), Feb. 24A
 Hypnography: A Study in the Therapeutic Use of Hypnotic Painting (A. Meares), 156
 Hypophysectomy (O. H. Pearson), 368
 Inhalation Analgesia in Childbirth (E. H. Seward and R. Bryce-Smith), 156
 International Nomenclature of Yaws Lesions, An (C. J. Hackett), July 22A
 Introduction to Anesthesia: The Principles of Safe Practice (Robert D. Dripps), 33
 It Pays to Be Healthy (R. C. Page), 150
 Kaposi's Sarcoma: Multiple Idiopathic Hemorrhagic Sarcoma (S. M. Bluefarb), 454
 Lens Materials in the Prevention of Eye Injuries (A. H. Keeney), 500
 Liver-Brain Relationships (I. A. Brown), Aug. 18A
 Lupus Nephritis (R. C. Muchrcke, R. M. Kark, C. L. Pirani, and V. E. Pollack), Feb. 22A
 Medical Interview, The (A. Meares), June 43A
 Medical Radiation Biology (F. Ellinger), May 24A
 Merck Manual of Diagnosis and Therapy (Merck and Co., Inc.), Feb. 22A
 Methods in Surgical Pathology (H. A. Teloh), May 26A
 Multiple Neurofibromatosis (F. W. Crowe, W. J. Schull, and J. V. Neel), July 22A
 Natural Childbirth (H. B. Atlee), Feb. 24A
 Nerves Explained: A Straightforward Guide to Nervous Illnesses (R. Asher), 327
 Non-Venereal Syphilis: A Sociological and Medical Study of Bejel (E. H. Hudson), 286
 Pathology for the Physician (W. Boyd), Dec. 26A
 Physics for the Anaesthetist Including a Section on Explosions (R. Macintosh, W. M. Mushin, and H. G. Epstein), 451
 Physiopathology of the Reticulo-Endothelial System (edited under direction of B. N. Halpern), Feb. 22A

- Pica (M. Cooper), Nov. 32A
 Postoperative Chest, The (H. T. Langston, A. M. Pantone, and M. Melamed), 424
 Progress in Radiobiology (J. S. Mitchell, B. E. Holmes, and C. L. Smith), Feb. 22A
 Psychiatric Education and Progress (J. C. Whitehorn) March 26A
 Psychobiology (A. Meyer), 416
 Recurrent Laryngeal Nerves in Thyroid Surgery, The (W. H. Rustad), Feb. 22A
 Regulation and Mode of Action of Thyroid Hormones (G. E. W. Wolstenholme and E. C. P. Millar), Jan. 24A
 Roentgenology of the Chest (C. B. Rabin), 500
 Salient Points and the Value of Venous Angiocardiography in the Diagnoses of the Cyanotic Types of Congenital Malformations of the Heart, The (B. M. Gasul, G. Hait, and E. H. Fell), 112
 Spinal Anesthesia (J. B. Dillon), 327
 Spine: Anatomico-Radiographic Studies, Development and the Cervical Region, The (L. A. Hadley), May 24A
 Spontaneous and Habitual Abortion (C. T. Javert), Dec. 26A
 Stress and Strain in Bones (F. G. Evans), July 22A
 Surgical Management of Pulmonary Tuberculosis, The (John D. Steele), Jan. 26A
 Urine and the Urinary Sediment (R. W. Lippman), May 24A
 Urology and Industry (L. P. Wershub), Jan. 26A
- CANCER,**
 endometrial, apparent relationship between Stein-Leventhal syndrome and, 417
 of thyroid gland, premature resort to x-ray therapy a common error in treatment of, 478
 progress in control of, 270
 viruses and their relationship to, 174
 Chest, injury from blunt trauma to the: its management in the community hospital, 124
 Children of America need our help, 167
 Clinical manifestations of the autonomic nervous system sequential to osteoarthritis of the cervical spine, 197
 Colfax tornado disaster, 361
 Colic in infancy, 60
 Colostomy, care of patient with a, 16
 Convulsions, recurrent, treatment of, in children, 461
- DEAFNESS,** toxic drugs and, 505
- Diabetic,**
 acidosis, treatment of, 37
 children's camp, use of multi-interval blood glucose method in, 378
- Diehl, Harold Sheely, M.D., 311
- Digests of Current Literature on Pain:**
 Analgesics and Their Antagonists: Some Steric and Chemical Considerations. Part III. The Influence of the Basic Group on the Biological Response (A. H. Beckett, A. F. Casy, and N. J. Harper), 35
 Assessment of the Cardiac Patient for Anesthesia, The (A. J. W. Beard and J. F. Goodwin), 35
 Basal Hypnosis by the Rectal Administration of a Multidose Thiobarbiturate Suppository (S. N. Albert, H. N. Eccleston, Jr., J. S. Boling, and C. A. Albert), 158
 Circulatory Responses During Anesthesia of Patients on Rauwolfia Therapy (C. S. Coakley, S. Alpert, and J. S. Boling), 452
 Contribution to the Therapy of Myocardial Depression Caused by Thiopentone Sodium (Studied by High Frequency Cardiomyography) (A. Fronek and Z. Pisa), 36
 Cortisone and Anesthesia (S. W. Gorens), 35
 Effect of Nisentil (Alphaprodine) Hydrochloride and Lofran T. M. (Levallophan) Tartrate on Respiration (J. Auerbach and C. S. Coakley), 328
 Facial Nerve Paralysis after General Anesthesia (J. E. Fuller and D. V. Thomas), 156
 Fatalities Following Topical Application of Local Anesthetics to Mucous Membranes (J. Adriani and D. Campbell), 35
 Geriatric Patient and Anesthesia, The (R. H. Barrett), 157
 Herniorrhaphy in the Poor-Risk Patient (P. H. Beves and C. H. J. Rey), 328
 Nitrous Oxide, Trichlorethylene, and Ether: A Balanced Anesthesia in Obstetrics (L. N. Cheeley), 452
 Pediatric Anesthesia (L. D. Bridenbaugh, Jr.), 36
 Physiology of the Adrenal Gland (J. H. Burn), 452
 Prevention, Recognition and Treatment of Postoperative Atelectasis (P. A. Clayton), 452
 Pudendal Block: Two New Techniques (V. Apgar), 158
 Respiratory Adjustments to Increases in External Dead Space (G. B. Clappison and W. K. Hamilton), 453
 Study of Hypodermic Needle Points (F. Franz and R. M. Tovell), 156
 Vomiting and Regurgitation During and After Anesthesia; Some Causes, Effects, Prevention and Management (J. Adriani), 157
 Diseases, systemic, lesions of the oral mucosa in, 336
 Donahoe, Will E., M.D., physician, educator, and humanitarian, 71
 Drug synergism in the management of arthritides, 185
 Drugs, newer hypotensive, comparative clinical pharmacodynamic evaluation of, 19
 Duodenum, congenital atresia of, twenty-one-year interval report, 465
 Dysmenorrhea, primary, current concepts and treatment, 322
- ECZEMA,** allergic rhinitis, and asthma in infancy and childhood, 373
- Editorials:**
 Common Pain and an Uncommon Problem, A. 34
 Health Supervision of Children, 111
 Last Tubercle Bacillus, 148
 "Lest We Forget," 205
 Nursing Home Care, 499
 Radiation Hazards, 147
- Education,**
 professional, for better health, Minnesota shares in, 284
 professional, in WHO programs, 237
 Emergency room patient, some responsibilities of the physician in care of, 508
 Epilepsy, childhood, general principles for drug therapy in, 182
 Erythema nodosum, 303
 Esophagus, stricture of, due to ingestion of Clinitest tablet, 533
- FARGO** tornado—medical aspects, 307
- Femoral,**
 head replacement prostheses, study of, 369
 shortening for equalization of leg length, 1
- Food and health,** 254
- Fractures,**
 compound, modern treatment of, 290
 multiple, immediate planning for definitive treatment of severely injured individuals with, 103

GYNECOLOGY,

- office, 91
- Pelvic pain in women—a universal problem, 151

HEALTH,

- better, Minnesota shares in professional education for, 284
- contribution of the hospital to improvement of, 264
- education, role of, in raising standards of world health, 243
- food and, 254
- international, in the Americas, 223
- international, voluntary agencies in, 261
- occupational, international aspects of, 251
- of the American Indians, 108
- programs, world, nursing in, 245
- world, role of health education in raising standards of, 243

Heart,

- disease—a world health problem, 266
- disease, surgery in, 73

Hemorrhage, spontaneous subarachnoid, 82

- Herpes simplex virus infections, recurrent, vaccinia virus immunization of patients with, 501

Hoarseness and related voice disorders, clinical significance of, 50

- Hodgkin's disease, intermittent obstructive jaundice in: report of a case, 99

Hormone support, sex, for castrate or senescent woman—TACE with Androgen: review of, experience, 343

Hypertension, curable, 472

INFANTS, colic in, 60

- Injury from blunt trauma to the chest: its management in the community hospital, 124

JAUNDICE, intermittent obstructive, in Hodgkin's disease: report of a case, 99

LACTATION, suppression of with an oral androgen-estrogen preparation, 491

Lancet Clinical Reviews: 69, 320, 366, 533

Laryngology,

- clinical significance of hoarseness and related voice disorders, 50

Lips, incomplete cleft, surgical repair of, 366

MALARIA incidence in the world today, 248

Maternal mortality in North Dakota, 421

Mayer, Roland G., 1891-1958, 199

Mechanism of parathyroid function, 190

Meningitis, meningococcic, and meningococcemia with probable Waterhouse-Friderichsen syndrome, 69

Meningococcemia, meningococcic meningitis and, with probable Waterhouse-Friderichsen syndrome, 69

Methocarbamol (Robaxin) in an industrial facility, clinical evaluation of, 531

Meyerding, Edward A., M.D., physician, educator and friend, 142

Migraine, unusual manifestations of, 449

Mucosa, oral, lesions of in some systemic diseases, 336

Multiple sclerosis, prevalence and incidence of in Missoula County, Montana, 358

NEONATAL period, observations on prevention of death in, 484

Neuralgia,

- tic douloureux, management of, 29

Nine years in the regional office in Southeast Asia, 216

North Dakota State Medical Association, transactions of, 381, 424

Not by bread alone, 160

Novak, Edward E., M.D.—pioneer doctor, educator, financier, and animal husbandry expert, 363

Nursing in world health programs, 245

OBSTETRICS,

- maternal mortality in North Dakota, 421

Obstetric emergencies in general practice, 294

Ocular symptoms, diagnostic value of, 11

Oral mucosa, lesions of in some systemic diseases, 336

Orthopedics,

- femoral shortening for equalization of leg length, 1

Osteoarthritis of the cervical spine, clinical manifestations of the autonomic nervous system sequential to, 197

Ovarian tumors, 54

PAIN,

- Dysmenorrhea, primary, current concepts and treatment, 322

pelvic, in women—a universal problem, 151

tic douloureux, management of, 29

unusual manifestations of migraine, 449

Palmer, Carroll E., merits world-wide recognition, 319

Parathyroid function, mechanism of, 190

Pediatrics,

- eczema, allergic rhinitis, and asthma in infancy and childhood, 373

observations on prevention of death in the neonatal period, 484

rectal bleeding in infants and children, 86

treatment of recurrent convulsions in children, 461

use of multi-interval blood glucose method in a diabetic children's camp, 378

Pelvic pain in women—a universal problem, 151

Pericarditis, acute nonspecific, 77

Pilonidal disease, 46

Postoperative medical emergencies, 347

Power lawn mowers—a new hazard, 356

Prefatory note from the director-general of the World Health Organization, 201

Prostheses, femoral head, study of, 369

Pseudohermaphroditism, female, case report, 320

Puberty, dysfunctional uterine bleeding during, 521

Public health,

- animal health problems a challenge to, 274

in Africa, 207

in Eastern Mediterranean, 219

in Europe, 221

in Western Pacific, 214

international cooperation in, prior to establishment of the World Health Organization, 233

RADIATION, ionizing, in medicine—a useful tool and a hazard, 114

Rehabilitation of the disabled, 282

Rheumatic fever: a review, 510

Rhinitis, allergic; eczema, and asthma in infancy and childhood, 373

Rigler, Leo G., M.D., 535

SANITATION, environmental, in a global setting, 240

Scarlet fever, 456

Stein-Leventhal syndrome and endometrial carcinoma, apparent relationship between, 417

Stress in the world, the individual and the doctor, 280

Surgery,

- in heart disease, 73

vascular, outlook of upon the aged, 329

- TACE with Androgen for castrate or senescent woman; review of experience, 343
- Thrombophlebitis, trauma and, 43
- Tic douloureux, management of, 29
- Tolbutamide dilemma, 287
- Tornado
disaster, Colfax, 361
Fargo—medical aspects, 307
- Trauma and thrombophlebitis, 43
- Tuberculin test, the, 132
- Tuberculosis,
decade in retrospect and in prospect, 257
from man to animals, 138
in a controlled institutional environment, development of, 162
spinal, and simulative disease, debridement and panarthrodesis for, 351
- Tumors, ovarian, 54
- Tuohy, Edward L., M.D., 494
- URINARY tract, injuries of, 467
- Uterine bleeding, dysfunctional, during puberty, 521
- Uterus didelphys—case report, 489
- VACCINIA virus immunization of patients with recurrent herpes simplex virus infections, 501
- Venereal disease control, years of progress in, 528
- Viruses and their relationship to cancer, 174
- WATERHOUSE-Friderichsen syndrome, meningococcal meningitis and meningococcemia with probable, 69
- World Health Organization,
in an era of chemotherapy, 525
programs, professional education in, 237
ten years of progress, 226

AUTHORS INDEX

- Adams, B. C. (co-author), Debridement and panarthrodesis for spinal tuberculosis and simulative disease: preliminary report, 351
- Anderson, Gaylord W., "Lest we forget" (editorial), 205; Minnesota shares in professional education for better health, 284
- Arneson, W. A. (co-author), Congenital atresia of the duodenum: twenty-one year interval report, 465
- Banner, Edward A., Office gynecology, 91
- Beierwaltes, W. H. (co-author), Premature resort to x-ray therapy: a common error in treatment of carcinoma of thyroid gland, 478
- Bellomo, James (co-author), Female pseudohermaphrodisism, a case report, 320; (co-author), Unusual manifestations of migraine, 449
- Berg, H. Milton (co-author), Leo G. Rigler, M.D., 535; Radiation hazards (editorial), 147
- Bernstein, William C., Care of the patient with a colostomy, 16
- Black, J. Harvey, The medicinal treatment of asthma, 105
- Blanchard, Kenneth (co-author), Drug synergism in the management of arthritides, 185
- Bosch, Herbert, Environmental sanitation in a global setting, 240
- Boudreau, Frank G., International cooperation in public health prior to establishment of the World Health Organization, 233
- Briggs, John F. (co-author), Female pseudohermaphrodisism, a case report, 320; Surgery in heart disease, 73; (co-author), Unusual manifestations of migraine, 449
- Burgess, R. C., Food and health, 254
- Burton, John, Role of health education in raising standards of world health, 243
- Cambournac, F. J. C., Public health in Africa, 207
- Candau, M. G., Prefatory note, 201
- Carr, E. A., Jr. (co-author), Premature resort to x-ray therapy: a common error in treatment of carcinoma of thyroid gland, 478
- Cavanagh, Denis, Obstetric emergencies in general practice, 294
- Clark, E. Gurney, Years of progress in venereal disease control, 528
- Cottam, G. I. W. (co-author), Congenital atresia of the duodenum: twenty-one-year interval report, 465
- Crosby, Edwin L., Contribution of the hospital to the improvement of health, 264
- Darner, C. B. (co-author), Sex hormone support for castrate or senescent woman—TACE with Androgen: review of experience, 343
- Diehl, Harold S., Progress in control of cancer, 270
- Diessner, Grant R. (co-author), Intermittent obstructive jaundice in Hodgkin's disease: report of a case, 99
- Dingledine, W. S. (co-author), Premature resort to x-ray therapy: a common error in treatment of carcinoma of thyroid gland, 478
- Dixon, George L., Immediate planning for definitive treatment of severely injured individuals with multiple fractures, 103
- Dodd, Paul S., The tuberculin test, 132
- Dodds, G. A. (co-author), Fargo tornado—medical aspects, 307
- Douglas, G. C. (co-author), Pelvic pain in women—a universal problem, 151
- Douglas, G. F. (co-author), Pelvic pain in women—a universal problem, 151
- Douglas, G. F., Jr. (co-author), Pelvic pain in women—a universal problem, 151
- Douglas, Sarah F. (co-author), Pelvic pain in women—a universal problem, 151
- Douglas, W. W. (co-author), Pelvic pain in women—a universal problem, 151
- Eyres, T. E. (co-author), Vaccinia virus immunization of patients with recurrent herpes simplex virus infections, 501
- Fang, I. C., Public health in the Western Pacific, 214
- Farr, John, Trauma and thrombophlebitis, 43
- Felland, O. M., Colfax tornado disaster, 361

- Flink, Edmund B. (co-author), Treatment of diabetic acidosis, 37
- Ford, Ralph A. (co-author), Drug synergism in the management of arthritides, 185
- Fremont, Rudolph E., Comparative clinical pharmacodynamic evaluation of newer hypotensive drugs, 19
- Friedell, Aaron, Angina pectoris treated by relaxation and automatic attentive respiration, 7
- Gayral, Louis (co-author), Clinical manifestations of the autonomic nervous system sequential to osteoarthritis of the cervical spine, 197
- Gelperin, Abraham, The development of tuberculosis in a controlled institutional environment, 162
- Gifford, Ray W., Curable hypertension, 472
- Gillam, John S. (co-author), Sex hormone support for castrate or senescent woman—TACE with Androgen: review of experience, 343
- Goldfarb, Alvin F. (co-author), Dysfunctional uterine bleeding during puberty, 521; (co-author), Primary dysmenorrhea: current concepts and treatment, 322
- Goldwater, Leonard J., International aspects of occupational health, 251
- Grzegorzewski, Edward, Professional education in WHO programs, 377
- Hall, R. R. (co-author), Debridement and panarthrodesis for spinal tuberculosis and simulative disease: preliminary report, 351
- Hart, George M., Femoral shortening for equalization of leg length, 1: Study of femoral head replacement prostheses, 369
- Haunz, E. A., The tolbutamide dilemma, 287; Use of the multi-interval blood glucose method in a diabetic children's camp, 378
- Heck, Frank J. (co-author), Intermittent obstructive jaundice in Hodgkin's disease: report of a case, 99
- Hirshboeck, Frank J., Edward L. Tuohy, M.D., 494
- Hitchcock, Claude R. (co-author), Outlook of vascular surgery upon the aged, 329
- Hollenhorst, Robert W., The diagnostic value of various ocular symptoms, 11
- Horton, George W., The modern treatment of compound fractures, 290
- Hudgins, Herbert A., Health of the American Indians, 108
- Hunter, G. Wilson (co-author), Sex hormone support for castrate or senescent woman—TACE with Androgen: review of experience, 343
- Hyde, H. van Zile, The World Health Organization—ten years of progress, 226
- Jackson, Byron (co-author), Fargo tornado—medical aspects, 307
- Johnson, Frank E., Injury from blunt trauma to the chest: its management in the community hospital, 124
- Keith, Hadow M., Treatment of recurrent convulsions in children, 461
- Keller, John M., Uterus didelphys—case report, 489
- Kelly, James H., Acute nonspecific pericarditis, 77
- Krusen, Frank H., Rehabilitation of the disabled, 282
- Kurland, Leonard T. (co-author), Prevalence and incidence of multiple sclerosis in Missoula County, Montana, 358
- Lamb, Donald, Postoperative medical emergencies, 347
- Landes, Herbert E. (co-author), Injuries of the urinary tract, 467
- Lindsay, D. T. (co-author), Fargo tornado—medical aspects, 307
- Litzow, Thaddens J., Surgical repair of incomplete cleft lips, 366
- Livingston, Samuel, General principles for drug therapy in childhood epilepsy, 182
- Loken, Merle K. (co-author), Ionizing radiation in medicine—a useful tool and a hazard, 114
- Lucy, Robert E. (co-author), Apparent relationship between the Stein-Leventhal syndrome and endometrial carcinoma, 417
- Lundy, John S., A common pain and an uncommon problem (editorial), 34
- Mani, Chandra, Nine years in the regional office of Southeast Asia, 216
- Marvin, James F. (co-author), Ionizing radiation in medicine—a useful tool and a hazard, 114
- Mazzia, Valentino D., An anesthesiologist's approach to prevention of operating room deaths, 64
- McClure, John N., Jr., Power lawn mowers—a new hazard, 356
- McFadden, Robert L., Stricture of esophagus due to accidental ingestion of Clintest tablets, 533
- Melver, Pearl, Nursing in world health programs, 245
- Medovy, Harry, Observations on prevention of death in the neonatal period, 484
- Middleton, William S., Not by bread alone, 160
- Moore, John H., Maternal mortality in North Dakota, 421
- Morse, George D., Tuberculosis from man to animals, 138
- Mosser, Donn G. (co-author), Ionizing radiation in medicine—a useful tool and a hazard, 114
- Murphy, Thomas O. (co-author), Outlook of vascular surgery upon the aged, 329
- Myers, J. Arthur, Carroll E. Palmer merits world-wide recognition, 319; Children of America need our help, 167; Edward A. Meyerding, M.D.—physician, educator, and friend, 142; Edward E. Novak, M.D.—pioneer doctor, educator, financier, and animal husbandry expert, 363; Harold Sheely Diehl, M.D.—physician, investigator, educator, administrator, and benefactor of mankind, 311; Last tubercle bacillus (editorial), 148; Roland G. Mayer, 1891-1958, 199; Will E. Donahoe, M.D., physician, educator, and humanitarian, 71
- Neuman, W. F., The mechanism of parathyroid function, 190
- Nenwirth, Eugene (co-author), Clinical manifestations of the autonomic nervous system sequential to osteoarthritis of the cervical spine, 197
- Nicholl, Willard (co-author), Prevalence and incidence of multiple sclerosis in Missoula County, Montana, 358
- Norm, H. A. (co-author), Fargo tornado—medical aspects, 307
- Olwin, Thomas K. (co-author), Treatment of diabetic acidosis, 37

- Palmer, Carroll E., Tuberculosis: a decade in retrospect and in prospect, 257
- Perkins, James E., Voluntary agencies in international health, 261
- Perry, Harold O., Lesions of the oral mucosa in some systemic diseases, 336
- Peterson, Harold O. (co-author), Leo G. Rigler, M.D., 535
- Petzing, Harry E. (co-author), Suppression of lactation with an oral androgen-estrogen preparation, 491
- Phelan, John T., Some responsibilities of the physician in the care of the emergency room patient, 508
- Pirtle, E. C. (co-author), Vaccinia virus immunization of patients with recurrent herpes simplex virus infections, 501
- Plumb, Carl S., Clinical evaluation of methocarbamol (Robaxin) in an industrial facility, 531
- Poser, Charles M., Management of tic douloureux, 29
- Pray, Laurence G., Health supervision of children (editorial), 111; Scarlet fever, 456
- Raile, Richard B. (co-author), Erythema nodosum, 303; (co-author), Meningococcal meningitis and meningococcemia with probable Waterhouse-Friderichsen syndrome, 69
- Randall, Clyde E., Ovarian tumors, 54
- Rathbun, J. C., Rectal bleeding in infants and children, 86
- Ripple, Rudolph J., Jr., Spontaneous subarachnoid hemorrhage, 82
- Rusk, Howard A., Stress in the world, the individual and the doctor, 280
- Russell, Paul F., Malaria incidence in the world today, 248
- Siedler, Howard D. (co-author), Prevalence and incidence of multiple sclerosis in Missoula County, Montana, 358
- Snelling, Charles E., Colic in infancy, 60
- Soper, Fred L., International health in the Americas, 223
- Sorkness, Joseph (co-author), Apparent relationship between the Stein-Leventhal syndrome and endometrial carcinoma, 417
- Sontham, Chester M., Viruses and their relationship to cancer, 174
- Spink, Wesley W., WHO in era of chemotherapy, 525
- Steele, James H., Animal health problems: a challenge to public health, 274
- Stone, Martin L. (co-author), Dysfunctional uterine bleeding during puberty, 521; (co-author), Primary dysmenorrhea: current concepts and treatment, 322
- Swaiman, Kenneth F. (co-author), Erythema nodosum, 303; (co-author), Meningococcal meningitis and meningococcemia with probable Waterhouse-Friderichsen syndrome, 69
- Swenson, John A. (co-author), Apparent relationship between the Stein-Leventhal syndrome and endometrial carcinoma, 417
- Taba, A. H., Public health in the Eastern Mediterranean, 219
- Thompson, George (co-author), Sex hormone support for castrate or senescent woman—TACE with Androgen: review of experience, 343
- Triggs, P. O. (co-author), Fargo tornado—medical aspects, 307
- Tudor, Robert B., Eczema, allergic rhinitis, and asthma in infancy and childhood, 373; Rheumatic fever, 510
- Unher, Morris (co-author), Suppression of lactation with an oral androgen-estrogen preparation, 491
- van de Calseyde, Paul J. J., Public health in Europe, 221
- Van Slyke, C. J., Heart disease—a world health problem, 266
- Von Leden, Hans, Clinical significance of hoarseness and related voice disorders, 50
- Wehrs, Roger E., Toxic drugs and deafness, 505
- Weisberg, Jerry (co-author), Use of the multi-interval blood glucose method in a diabetic children's camp, 378
- Wilson, Edward T. (co-author), Injuries of the urinary tract, 467
- Wright, Willard A., Nursing home care (editorial), 499
- Zimmerman, Karl, Pilonidal disease, 46

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Pathology for the Physician, by WILLIAM BOYD, M.D., 1958. Philadelphia: Lea & Febiger, 900 pages. \$17.50.

This is the sixth edition of Dr. Boyd's well-known text of general pathology formerly entitled *Pathology of Internal Diseases*. All subjects have been brought up-to-date, and much new material has been introduced in old chapters, such as a detailed discussion of the carcinoid syndrome and serotonin in the chapter on intestinal diseases, plus the addition of 3 new chapters covering diseases of the joints, diseases of muscles, and the physiology and pathology of the internal environment. As previously, Dr. Boyd devotes much space to disturbed function as well as anatomic changes and introduces into both phases of his discussion the latest materials available. There is an account of the electron microscopic structure of the glomerulus, needle biopsy of the kidney, and other morphologic advances together with the recent work on enzyme activity in renal tubular function, aldosteronism, and so forth.

Dr. Boyd's presentation is always lucid and understandable. More important, the writing is extremely interesting with occasional humorous asides. Although somewhat short in the fine details required of the morphologic pathologist, it is of value to the pathologist in understanding the disease from a physiologic point of view and is an excellent book for the internist in correlating all phases of any particular disease process.

JOHN COE, M.D.

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Bone Tumors, by DAVID C. DAHLIN, M.D., 1957. Springfield, Illinois: Charles C Thomas. \$11.50.

This excellent treatise on bone tumors has been needed for many years. Dr. Dahlin's well-known acumen and knowledge of bone tumors has been applied to a review of 2,276 bone tumors which have been carefully and personally studied by the author at the Mayo Clinic. The scope of this study is enormous, and the volume is probably the most concise and informative of its size. Much of this work has been previously presented in separate papers by Dr. Dahlin and his colleagues. The format is particularly pleasing. It is exceptionally readable and is presented as briefly as possible. The illustrations are of the finest quality.



This volume contains little that is controversial. It is a book that every pathologist and orthopedic surgeon should have in his library.

JOHN H. MOE, M.D.

•
Spontaneous and Habitual Abortion, by CARL T. JAVERT, M.D., 1957. New York: McGraw-Hill Book Co., Inc., 450 pages. \$11.00.

In this volume, the author presents his numerous contributions to the literature of spontaneous abortion. Foremost is a thoughtful and comprehensive review of 2,000 consecutive abortuses, with discussion of the pertinent physiology and pathology well supplemented by numerous illustrations, case reports, and a number of entertaining cartoons. The author has taken particular care to examine decidual tissue and has obtained curettage material in nearly 90 per cent of cases. He stresses the value of labor records kept during the course of expulsion of the abortus and of examination of the ovofetus and placenta in undisturbed condition. Thirty-five per cent of these unselected specimens showed abnormality of the ovofetus, and significant abnormality of the decidua was found in 93 per cent of cases. The low incidence of decidual abnormality in the control series of unintentional and therapeutic abortions is used as evidence that decidual pathology is primary to abortion, not secondary to expulsion. The incidence of reported cord abnormalities is exceptionally high, but it represents observations of less than one-third of all specimens. The author reports no cases of incompetent internal cervical os, but the cases of premature dilatation of the cervix that he reports could be separated from the phenomena reported by Lash and Lash only with difficulty.

Dr. Javert's views relative to the etiology and prevention of habitual abortion are well known and somewhat controversial. Many will disagree with his observation of clinical

evidence of scurvy in one-third of all women who abort. Many will question the value of administration of vitamins C, P, and K to habitual aborters and the need for interdiction of smoking in this group. The evidence for the abortion-producing effect of orgasm in contrast to the purported safety of coitus without orgasm must only be interpreted as inconclusive. The author's proposition that the low reported abortion rate in unwed mothers is due to their lack of postconceptual coitus to orgasm is subject to some question.

Throughout the author's discussion of the management of the habitual abortion patient, his deep concern for the problem is obvious, as is the enormous reassurance, encouragement, and emotional support which he gives his patients. One would wonder whether this was not the cornerstone of his therapeutic regime and of signal import in effecting the 81 per cent cure rate which he cites. Certainly, any regime yielding this degree of success in these vexing patients merits consideration. It is interesting that no endocrine therapy was employed.

The importance which Dr. Javert attaches to emotional factors in the production of abortion is manifest by the size of the chapter on "Psychosomatology."

This volume will be of value to many practitioners of obstetrics and gynecology, and, to those trained in psychiatric discipline, the exposition of organic effects of emotion will be of interest.

THOMAS KIRSCHBAUM, M.D.

•
Anatomist at Large, by GEORGE W. CORNER, M.D., 1958. New York: Basic Books, Inc., 215 pages. \$4.00.

This is a charming book by one of the great leaders in embryologic research. As physicians know, Dr. Corner has made many studies on the mammalian ovum and the way in which it travels from the ovum to the uterus where it develops to maturity. He is a delightful person who writes in a very interesting manner. He has known many of the great men in American medicine, and he writes well about his contacts with them. Every physician who wishes to add to his education will do well to read this book. It is a wonderful volume to put in the hands of a medical student, especially one who is thinking of going into research.

WALTER C. ALVAREZ, M.D.

